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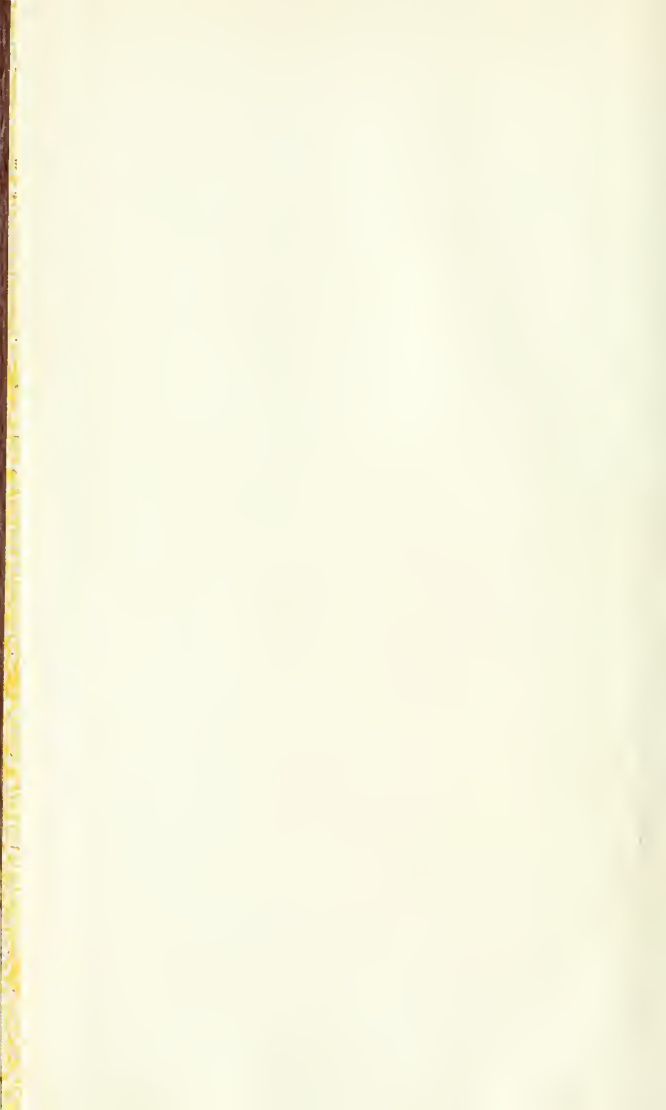
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THE
OPHTHALMIC REVIEW,
A
MONTHLY RECORD
OF
OPHTHALMIC SCIENCE.

EDITED BY
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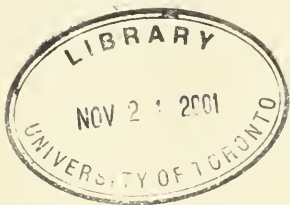
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VOLUME II.

1883.



LONDON :
J. & A. CHURCHILL, NEW BURLINGTON STREET.



PRINTED BY WRIGHT, DAIN, PEYTON, AND CO.,
AT THE HERALD PRESS, UNION STREET, BIRMINGHAM.

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CASE OF OPTIC NEURITIS FOLLOWED BY DROPPING OF FLUID FROM THE NOSTRIL.*

BY EDWARD NETTLESHIP, F.R.C.S.,
OPHTHALMIC SURGEON TO ST. THOMAS'S HOSPITAL.

Annie L., 23, an intelligent, fairly educated girl, rather stout, with large mammary glands, and somewhat prominent eyes, but of healthy appearance, came to the Hospital in November, 1881. Her mother told me she had had several attacks of "inflammation of the lungs," and that some permanent disease had been pronounced to have settled in one lung. She had never been very strong, and the catamenia were habitually scanty, but she seems as a rule to have had pretty good health. There was nothing of importance in the family history.

Not quite two years before I saw her she became ill with palpitation and what were called hysterical fits, and is said to have lost her senses. This was about Christmas 1879. In the following May (1880) she was so far well again that she took a place as barmaid; she had previously been teaching as a nursery governess, but owing to family reverses was obliged to seek other employment. A few days after beginning the bar-work she again became ill, "forgot her words and was upset in the brain," and had to give up the place. She went to stay with an aunt in the country, and there became worse, with much headache and prostration. She was in bed for several weeks, and was especially enfeebled down the left side. She had palpitation, and her eyes are said to have become prominent. There was no vomiting. During the illness her sight failed, became for a time very bad, and then improved up to the state in which I found it, and in which it has since remained. For a time she used to have a noise in the chest on lying down. The headache ceased, and has not returned. She did not lose flesh in the illness. It was not till from twelve to eighteen months after the above illness that I saw her.

On November 8th, 1881, and following days the ocular condition was as follows:—

* Read at the Worcester Meeting of the British Medical Association, August, 1882.

V (R. $\frac{20}{100}$ and 4 J., improved to $\frac{20}{70}$ by $\frac{1}{1.25}$ D. sph.
 { L. $\frac{20}{0}$ and 20 J. letters, not improved.

The optic discs showed well marked post-papillitic atrophy, the margins still hazy and swollen, the veins tortuous and all the vessels considerably shrunken; in the R., one or two white dots were seen in the retina near the yellow spot. Pupils very large and sluggish. She was tried very carefully for colour-blindness with wools, Stilling's tables, and Bull's test, but without showing the slightest defect. The visual field in each eye was very much contracted, the defect in the L. (worse eye) coming quite to the fixation point; in each eye the outer part of the field was best represented. The fields for green were very small, but in the better eye the red field was almost co-extensive with that for white. Dr. Sharkey examined her carefully and found no evidence of disease in the chest or elsewhere.

At her first visit she complained that for about two months she had been much annoyed by a profuse running of clear water from the nose, so that she had to be constantly sniffing and holding a handkerchief to the nostrils; she said she would sometimes have to use a dozen handkerchiefs a day. The constant sniffing had attracted our attention before she spoke of it. Observation at subsequent visits quite confirmed her statements. In February last (1882) she collected an ounce or more of the fluid in two hours, and Mr. S. Plowman, the Chief Dispenser to St. Thomas's Hospital, was kind enough to give me the following report upon it:—"The fluid was colourless, but slightly ropy and opalescent. It was neutral to test-paper. It contained a considerable quantity of chlorides, but only traces of phosphates and sulphates. It contained no sugar. It gave the various proteid reactions, and responded to the tests for mucin. No quantitative analysis was attempted, but albumen seemed to be present in somewhat larger quantity than mucin." We may probably conclude from this analysis that the fluid was derived from the nasal cavities and was not meningeal.

The dropping seemed to vary much on different days and at different times, but we could not make out any rule of variation, except that it gave no trouble when she was in bed; it was not obviously affected by almost total abstinence from all fluid for a whole day, nor by a rather long course of ergot, nor by a

weak salt and water nasal douche. There was for a time some loss of taste and smell, but these symptoms were, I am sorry to say, not accurately tested. She at first said that both nostrils dripped, but Dr. Felix Semon, who made for me a very careful examination of the nose, came to the conclusion, afterwards confirmed by observation, that all the fluid came from the left nostril. Dr. Semon, as well as Dr. Sharkey and Mr. Clutton, both of whom examined the patient carefully on different occasions, found the mucous membrane of the left nostril swollen and excoriated, that of the right nostril being healthy. Dr. Semon also noticed that the reflex irritability of the soft palate on both sides was absent.

December, 1882. She comes to the Hospital at intervals, and was last seen in October. The dripping had then become less troublesome, and she was altogether in better health and spirits. The sight has not altered and the discs are still rather hazy. At times she has a loud ringing cough.

This case may prove interesting, especially in connection with the cases under a nearly similar title by Mr. Priestley Smith. The only other case published at all similar which I know of (for Sir James Paget's case does not seem to be of the same class) is one published by Dr. Baxter, in "Brain," for January last (Vol. IV., p. 525). In Baxter's case the patient, also a woman, suffered from headaches beginning at the root of the nose, peculiar twitchings of certain muscles on the left side of the trunk, complicated by symptoms exactly like those of ordinary hysteria, persistent flow of watery fluid from one nostril (the right), enlargement of the thyroid body, and double optic neuritis passing nearly to blindness. She died with cerebral symptoms about three years after the above affections set in. At the post-mortem no coarse disease could be found in the brain, but the skull bones were unusually dense. It will be seen that there is considerable resemblance in the general character of the symptoms in the two cases, and especially that, whilst there was thyroid enlargement in one, there was some proptosis and palpitation, as in exophthalmic goitre, in the other.

PERSISTENT DROPPING OF FLUID FROM
THE NOSTRIL ASSOCIATED WITH
ATROPHY OF THE OPTIC NERVES AND
OTHER BRAIN SYMPTOMS.*

By PRIESTLEY SMITH,

OPHTHALMIC SURGEON TO THE QUEEN'S HOSPITAL, BIRMINGHAM, AND
CONSULTING OPHTHALMIC SURGEON TO THE BIRMINGHAM SKIN
AND LOCK HOSPITAL AND THE KIDDERMINSTER INFIRMARY.

In the *Medical Times and Gazette* for September 19th, 1857, Dr. Elliotson recorded the case of a lady from whose left nostril there was a persistent dropping of colourless watery fluid. Violent pain in the head, of a few hours' duration, preceded the onset of the dropping. The patient suffered two separate attacks of the disorder; the first subsided spontaneously, the second came to an end during a course of treatment by sulphate of zinc given internally and injected locally; but whether the zinc really effected the cure remained somewhat doubtful.

A very similar case is recorded by Sir James Paget in the *Transactions of the Clinical Society* for the year 1878. Here also a watery fluid dropped persistently from the left nostril. The only noteworthy antecedents to the attack were a blow over the left frontal sinus six months previously, an unusually severe headache two months later, and a mental shock. In this case also the dropping ceased during treatment by sulphate of zinc; one month later the patient was subjected to great mental distress, fatigue, and cold; and died, after a three days' illness, of meningitis. The left antrum contained polypoid growths. The whole base of the skull, the cribriform plates of the ethmoid bone, the olfactory bulbs, and the dura-mater in relation with these were

* The greater part of this paper was read at the Worcester Meeting of the British Medical Association, August, 1882.

completely healthy ; nothing could be found to support the supposition that it was sub-arachnoid fluid which had dropped from the nostril.

To the foregoing cases I am able to add two others, which, so far as concerns the escape of fluid from the nostril and the chemical characters of the fluid, closely resemble them. In one of my cases there were polypoid growths in the nasal cavity ; in the other none were discovered ; but, as no post-mortem was made, their presence was not excluded. In Sir James Paget's case the polypi were not discoverable during life. In both of my cases symptoms of severe cerebral disorder occurred before the dropping of fluid began ; and at the time when this symptom was added both patients were blind from atrophy of the optic nerves. In each case temporary stoppage of the flow was associated on several occasions with recurrence of cerebral symptoms, which ended in the one case in death.

CASE I. (H 211). David S., aged 28, formerly a machinist, was brought to the Queen's Hospital Eye-Department on February 24, 1880. The following history is put together from the notes then taken, together with additional information obtained from the wife since the patient's death. In 1875 he had smallpox ; a month later, just as he was recovering, he began to suffer severe pain in the head and to have frequent attacks of vomiting ; his sight began to fail soon afterwards, and rapidly got worse ; within three or four months he was blind ; he remained liable to pain in the head. In 1879, *i.e.* four years later, and six months before I first saw him, fluid began to drop from the left nostril. When this had continued about four months, it diminished in quantity, and after a week, during which time he complained of pain in the head and drowsiness, it stopped. He slept thirty-six hours without waking, and for nearly a week was constantly falling asleep. He then brightened up again and the dropping returned, but through the right nostril instead of the left. Similar attacks of drowsiness, always preceded by arrest of the flow of fluid, recurred from time to time, never at longer intervals than two months. He would say, "my nose doesn't run as it ought to, I shall

be bad again." In the later attacks he was convulsed. He would become stupid, mumble words they couldn't understand, fall in a fit, in which face and limbs were violently convulsed, sleep heavily some hours, and then recover his usual condition, unconscious of what had occurred. The wife is certain the flow always stopped at these times as the pillows, which when he was in his usual condition were constantly wetted by the fluid, remained dry. In December, 1881, on a Friday, he said his nose was not running as usual; on Saturday he was heavy and dull; on Sunday afternoon he went to sleep sitting at the table, had a violent convulsion, remained unconscious for six days, during which time the face and arms were often convulsed, and died. The pillows remained dry throughout. No post-mortem examination was made.

At the time of my examination, six months after the dropping had begun, the patient's condition was as follows:—

Right eye.—Faint perception of light.

Left eye.—Totally blind. In both, media clear and discs atrophied, horizontal nystagmus, the right eye making a considerably larger excursion than the left. A colourless, clear fluid dropped from the right nostril at the rate of about five drops a minute; collected for fifteen minutes it measured 90 minims (equivalent to 18 fluid ounces in 24 hours). When the head was bent forwards, after having been held awhile erect, a considerable quantity flowed at once from the nostril, as though poured from some cavity in which it had collected. (The same was noted in Dr. Elliotson's case). Patient could blow freely down each nostril. He was thin and pale, but considered himself to be in good general health. Syphilis was denied, and there was no evidence of it. He stated that he habitually ate a great deal of salt, much more than he used to before the dropping began. The man remained under notice for a few weeks as an out-patient. Iodide of potassium was given for a fortnight without apparent effect. Bromide of potassium was then given, and had, according to the wife's statement, a decided effect in diminishing the tendency to drowsiness; it was continued for a month. I then heard no more of the case until quite lately, when I succeeded in tracing it, and learned the later particulars as stated above.

A specimen of the fluid was sent to Dr. MacMunn, of Wolverhampton, who kindly examined it by the spectroscope and otherwise, and reported the following characters:—

Reaction alkaline; S. G. about 1007, but the quantity too small for precise determination; chlorides present in abundance; no sugar; it contained alkali albumen; mucin was also present; in the spectroscope it gave the band of *sero-lutein* distinctly; the microscope showed some mucus corpuscles, and bacteria and vibrios. To this Dr. MacMunn added:—"It is hardly necessary to say that it gave no reaction with ferric chloride, as it could not well have been salivary. I should be inclined to think that it probably comes from the frontal sinus, as cerebro-spinal fluid is said to contain traces of sugar, or of a substance capable of reducing cupric oxide, and this gave none.* . . . There was one peculiarity about the fluid which I cannot understand, viz., it transmitted all the blue of the spectrum violet."

Case 2. (K. 37).—Edward Simpson, aged 22, formerly a jeweller's apprentice, was brought to the hospital on February 17th, 1882, on account of blindness. Six years previously he had been an in-patient in the physician's wards on account of severe brain symptoms; the record of his condition at that time is unfortunately very scanty. The history, as far as it can now be ascertained, is as follows:—In 1876, when he was 17 years of age, the boy was earning ten shillings a week as a jeweller's apprentice, and working hard at a night school as well. He was in fairly good health, but overworked, and very liable to headache. One evening, while sitting at a table, drawing, he suddenly called to his mother, put his hand to his head, fell forward, and became unconscious. The mother saw at once that "both eyes were turned right in to the nose, so that you could hardly see anything but the whites." During many months following his consciousness remained more or less imperfect, and he was at times violently delirious; he had violent pain in the head, frequent vomiting, and fits; he

* According to Hoppe-Seyler (Physiol. Chemistry, p. 605), no sugar is found under normal conditions in the cerebro-spinal liquid; but Prof. Turner found in it a body which reduced cupric oxide (Proc. Roy. Soc., VII., 1854-55, p. 89). According to Gamgee (Physiol. Chemistry, 1880), the specific gravity of cerebro-spinal liquid is 1005. For further analyses see Hoppe-Seyler, *loc. cit.*, p. 604; also Gamgee, p. 236. C. A. MACMUNN.

became totally blind. In the notes of his condition when in hospital, about four months after the onset of the attack, it is stated, "he answered sensibly on being pressed ; can turn both eyes inwards, neither of them outwards ; the eyes jerk, especially the left ; there is double optic neuritis passing into atrophy." After removal from the hospital, "to die," as his mother expected, he was for fourteen or fifteen months totally paralysed in the lower extremities, and had involuntary micturition and defecation. Two years and a half (November, 1878) after the beginning of the attack, and just as he was beginning to recover some power in his legs, fluid began to drop persistently from his right nostril. Some months later this nostril became stopped up, and a surgeon took something from it which he called a polypus ; it soon became stopped again, as it is now, and from that time until now the dropping has been through the left nostril. The mother states emphatically that during the time he was so very ill "the forehead got a tremendous size, and the eyes poked out."

The present condition of the patient is as follows :—He is thin and pale. The forehead is rather prominent: circumference of the head $22\frac{1}{2}$ inches. The legs are weak ; he cannot walk more than a hundred yards or so. Pupils dilated ; no perception of light in either eye ; discs atrophied ; no paralysis of any ocular muscle. The right nostril is occluded apparently by a polypoid growth ; fluid drops from the left. The flow varies in amount ; it is smallest when he is sitting still in the house ; a little movement, such as standing up and walking a few steps, generally increases it ; it is greatest out of doors. A teacupful was collected for inspection, at intervals, during about four hours ; the quantity discharged during 24 hours probably amounts to at least 12 to 15 ounces. Occasionally the dropping stops for as much as two or three days, and at these times he always notices that the nostril is stopped so that he cannot blow down it. The patient, who is now quite clear in mind and memory, and of considerable intelligence, describes the sensations which accompany the stoppage of the flow as follows :—"When the dropping stops I get a pain in the middle of my back, between the shoulders and along the shoulder blades ; the pain then passes up the neck ; I can feel it move up into my head ; it does not come

over the top of the head, but seems to move round into the forehead and temples ; I generally feel it at the bottom of my back at the same time. When the dropping comes back again the water runs freely for three or four minutes, and then the pain leaves the temples and forehead ; then after a while the pain returns in the head, and the water flows again for a few minutes, and when this has happened several times—especially if I walk about until a good lot of water has come away—the pain goes altogether.”

From July to February last the dropping never once stopped for more than a few minutes at a time, and during this time he suffered no pain. A fortnight since (March, 1882) the dropping stopped. He thinks he had taken cold, and on the second day the pain was so bad that he had to take to his bed ; he kept his bed four days ; the dropping then returned, and the pains left him. The mother has noticed that when the dropping stops he always passes more water by the kidneys.

Dr. MacMunn kindly examined a specimen of the fluid, with the following result :—“Reaction alkaline ; S. G. 1008 ; faint band of sero-lutein in both chemical and micro-spectroscope, but much more indistinct than in former specimen ; the violet very distinct, but blue also transmitted. Heat alone caused hardly any precipitate, and boiling with a few drops of acetic acid gave only a faint turbidity. Nitric acid in the cold produced some cloudiness soluble in excess of acid. Chlorides were present in abundance ; sulphates only in faint traces. No red colouration with ferric chloride. Boiled with cupric sulphate and caustic potash solution a violet reaction was produced, and a heavy brownish-red precipitate formed after boiling and standing. (The violet reaction denoted a proteid only.) The liquid was principally noticeable for the *small* amount of albumen it contained.”

Three questions arise in connection with these cases : What was the source of the fluid which dropped from the nose ? What was the connection between the flux and the brain symptoms ? What relation did polypoid growths in the nose bear to the other morbid changes ?

In view of the fact that arrest of the dropping was associated in both cases and on many occasions with

symptoms strongly suggestive of cerebral compression, it is difficult at first sight to lay aside the hypothesis of an escape of cerebro-spinal fluid ; yet this hypothesis appears to be hardly tenable, for in all four of the recorded cases sugar was absent from the fluid, and in Sir James Paget's case a close examination of the base of the skull, with this very supposition in view, revealed nothing to support it.

Seeing that polypoid growths, are known to have been present in two out of these four cases, and that in Sir James Paget's case they were not discoverable during life, the idea suggests itself that some such formation in one or other of the cavities connected with the nose may have been in all the cases the origin of the disorder, though why a discharge of fluid should accompany the growth of a polypus in some cases and be absent in all others remains unexplained. In both of my cases severe brain symptoms, with eventual atrophy of the optic nerves, *preceded* the onset of the dropping. May not these have been set up by encroachment of a morbid growth upon the upper wall of its containing cavity ; *e.g.*, the sphenoid or ethmoid cells—destruction of the bone and inflammation of the meninges. It is not necessary to assume that the growth pressed upon or in any way affected the optic nerves directly, for in one case certainly, and most probably in the other also, the atrophy of the nerves was consecutive to neuritis, and neuritis demands no special locality for the primary lesion.*

If the bony septum between the nasal cavities and the brain was actually damaged in the way suggested it is easy to conceive how a stoppage of the downward flow of the fluid through the nostril might lead to pressure on the brain.

* I have the record of a case in which blindness was almost certainly produced by the upward pressure of a polypus, and was immediately removed by the removal of the growth. Want of space obliges me to postpone the details.

The foregoing was written before Mr. Nettleship's case was before me, and before my attention was drawn by him to the record of Dr. Baxter's case in *Brain* (Vol. IV., p. 525). On referring to the latter I note the following passages as of especial importance :—The discharge was “a clear, watery fluid, sometimes rather offensive, occasionally tinged with blood. . . .” “The posterior wall of the pharynx is smeared with thin muco-purulent matter, which has found its way down from the naso-pharynx. . . . No ulceration or disease of bone can be detected by examining with the rhinoscope, or from the front.” The hypothesis formed during life was “that of some chronic disease of the body of the sphenoid or the neighbouring part of the ethmoid bone, leading to inflammatory changes about the optic chiasma and adjoining parts of the brain. Chronic mischief in this locality might account for the headaches, the neuritis and peculiar hemiopia, as well as for the discharge from the nostril.” “At the post-mortem examination . . . the head only was opened. . . . The interior of the skull, the brain and its membranes, were very carefully examined in a good light, and nothing in any way abnormal was discovered. With bone nippers I made my way into the cavities of the sphenoid and ethmoid without finding any evidence of disease.” The examination appears not to have extended far into the nasal cavities, and would certainly not exclude such disease as was present in Sir James Paget's case. The nature of the discharge shows that there certainly was some disease in this region, and on the whole it seems most probable that such disease was the origin of the brain symptoms, though how these should arise without evident changes at the base of the skull is not clear. It is noteworthy that in Sir James Paget's case, in which likewise the base of the skull appeared healthy, the patient died of meningitis following fatigue and exposure to cold, within one month after the arrest of the discharge from the nose.

R. BERLIN (Stuttgart). *The Physiology of Handwriting.*
Von Graefe's Arch., XXVIII., 2, p. 259.

This paper is the outcome of a commission appointed to report upon the influence of slanting writing on the eyes and figures of the school children in Würtemberg, and is the joint work of Prof. Berlin and Dr. Rembold. By slanting writing is to be understood the ordinary handwriting which is taught in England as well as in Germany, with the downstrokes slanting from right to left.

On investigating the manner in which the children wrote in a large school it was observed that there were three more or less sharply differentiated types of attitude adopted: (1) a relatively erect posture, with a considerable interval between the face and the copy book, and the pelvis approximately parallel to the edge of the table; (2) the head, *i.e.* the spinal column, bent to the left, with a smaller average distance between the face and the copy book, and the pelvis either (*a*) with an obliquity to the left, or (*b*) approximately straight; (3) the head bent to the right, with the face held close to the desk and copy book, and the pelvis obliquely to the right. Attitude No. 3 was by far the most common; next to it came No. 1; while No. 2 was only to be seen among a very few individuals. There were of course many intermediate positions, but by looking at the children from behind and above it was easy to distinguish these three typical attitudes.

Observation from the side showed that while all the children stooped forward more or less, those of attitude No. 3 stooped the most, and those of No. 1 the least. Looking from the front showed that there was also a rotation of the head upon its vertical axis to the right, which, combined with the stoop forward, brought the left eye closer to the table than the right. This rotation was best marked in No. 3.

A constant relation was found to exist between the attitude of the child's body and the position of the copy book. The line joining the centres of the two eyes—the base line—when projected upon the copy book, always made an angle with the lines of the manuscript, so that at the place where the point of the pen happened to be, the base-line crossed the line of writing from above downwards, and from left to right. To this

rule there were a very few exceptions in which the base-line ran in the opposite direction, from below upwards, and from left to right; but these made up not quite two per cent. of the cases, and it was plain that the constant relation of the base-line to the lines of the copy book governed the attitudes assumed in practising slanting writing; that is to say, the position of the copy book determined the position of the whole body.

In attitude No. 3, the common one, the copy book was always on the child's right side, the lines being approximately parallel to the edge of the table—*erect dexter*. This being so, the child found it necessary to advance the left eye in order to comply with the law that the base line should cross the lines of the book downwards, from left to right; and it accomplished this partly by the bend of the head, and partly by the obliquity of the pelvis.

In attitude No. 1 the direction of the lines was extremely oblique, slanting upwards from left to right, the copy book being placed either on the right side of the child—*oblique dexter*—or directly in front—*oblique central*. In these positions the base line had to be kept more nearly parallel to the edge of the table, in order to produce the angle already described with the copy book lines, and this was effected with a relatively more correct attitude of the body.

In attitude No. 2 (*a*) the copy book was placed extremely obliquely, so that the angle between the lines and the edge of the table became actually greater than 45° . In this position the base line had to deviate to the left, to preserve its characteristic angle with the lines of the book, and hence these followed the bend of the neck to the left, and the accompanying obliquity of the pelvis.

This constancy in the relation of the base line to the lines of writing naturally brings forward the question—What law governs the direction of the base line? Berlin believes that he has answered the question satisfactorily by the discovery that the downstrokes of the writing, with very few exceptions, are so drawn that they make at the point of the pen an angle of 90° with the base line. Since the downstrokes of our oblique writing make an angle of about 45° , with the lines of the copy book, the base line, when projected on the book, should cut the lines at an angle of about 45° , running obliquely down-

wards to the right, and this has been found, with very few exceptions, to be the case. In the exceptional cases the angle between the downstrokes and the base-line is either considerably larger or considerably smaller than 90° , varying, namely, from 120° , or more, to 50° . It was found that in the first group of exceptions the upstrokes formed a right angle with the base line, and in the second group they lay parallel to it. These last cases are identical with those in which the base line crossed the copy lines upwards from left to right.

In addition to determining the attitudes, the form of the benches, the visual acuity, and the refraction, the Commission accurately measured the following quantities :—

1. The angle between the lines of the book and the edge of the table.
2. The angle between the lines of the book and the projected base line.
3. The angle between the projected base line and the downstroke.
4. The angle between the plane of sight and the horizon.
5. The distance between the centres of the pupils.
6. The differences between the distances of the right and left eyes from the surface of the table. From this, and the distance between the centre of the pupils, the angle between the base line and the plane of the table was calculated.
7. The differences in the distances of the two eyes from the point of the pen.
8. The degree of the stoop forwards; *i.e.*, the distance of the middle point of the base line from a vertical plane passing through the posterior edge of the table.
9. The distance of the middle point of the base line from the point of the pen in the several positions of the copy book already described, and both for upright and slanting writing. This distance was also measured in reading, for German characters and English characters separately, for writing both with and without ruled lines, and for writing on the black board. The number of children examined was 562, exclusive of 300 in the preliminary investigation.

Of the data thus obtained, Berlin discusses in the present paper those only which serve to elucidate the bearing of the laws of ocular movements upon the act of writing. First in importance is the fact that *the projected base line forms a right angle with the downstrokes*. The examination as to this point was made by means of a specially-constructed goniometer, the movable arms of which were placed, the one in the direction of the last-formed downstroke, the other parallel with the base line of the child's eyes, this being done in all cases by two observers, of whom one estimated the position from in front of the child, the other from behind and above. Although a certain amount of uncertainty and error was inevitable in this proceeding, the result, as above stated, was on the whole so constant that the observers regard it as the "key-stone" of the physiology of writing. Thus the table of results shows that among 346 cases the angle which the projected base line makes with the downstroke was between 95° and 85° in sixty-three per cent. ; between 85° and 75° in twenty-six per cent. ; and outside these limits, in only the remaining, eleven per cent. The average angle was 85.5° . The whole of the results are shown diagrammatically by a figure of radiating lines, in which each observation is marked in its own angle. This demonstrates at a glance that in the great majority of cases the angle was nearly a right angle, tending to be less rather than greater in the exceptional instances.

Besides these 346 cases there were 25 others which require special notice. In 18 of these the angle was considerably greater than 90° , namely from 104° to 128° , and in every one of them it was found that the base-line instead of making a right angle with the downstrokes, as in the generality of cases, made a *right angle with the upstrokes*. It is inferred that these children regarded the motion of their pens chiefly during the formation of the upstrokes, and let the downstrokes take care of themselves. In the remaining seven cases the angle varied between 50° and 70° , and in these it was found that the base-line was *parallel with the upstrokes*; that is, from the point of view of the second observer above and behind the writer. The explanation of this latter group was discovered during drawing-lessons. It was found that in drawing horizontal lines all the children without exception brought the paper into a position

which enabled them, by a simple abduction of the hand from left to right, to draw a line parallel to the base line ; they followed the hand by turning the head to the right, without losing the parallelism of the base line. It may be assumed that in the exceptional writing-positions just referred to the upstrokes are formed in this same manner.

To sum up the whole 371 cases :—in about 93 per cent. the projected base line was approximately perpendicular to the downstrokes, in 5 per cent. it was perpendicular to the upstrokes, and in 2 per cent. it was parallel to the upstrokes. It is clear then that the paths which the visual lines follow in the act of writing run essentially in two directions, the vertical and the horizontal, and this accords with a well ascertained law concerning ocular movements. In looking upwards and downwards, and in looking horizontally to either side the visual axes move in straight lines ; that is to say, the paths which they would describe upon a vertical plane parallel to the face are rectilinear ; but in all diagonal movements the paths are curvilinear, and the curvature is greatest when the direction of movement forms an angle of 45° with the horizon. Dominated by this law, which rests on anatomical conditions, the child can only draw the straight strokes of his letters in a perpendicular, or exceptionally in a horizontal direction, with regard to the base line of his eyes. If he draws them diagonally he involuntarily curves them in accordance with the curves of the diagonal visual paths. If he is compelled to write in slanting characters with the copy-book in the erect-dexter position, the position commonly adopted in schools, he evades the difficulty by twisting body and head until the base line of his eyes again forms a right angle with the downstrokes. It is possible that after long practice some slight concession on the part of the laws which govern the ocular movements may be gained, but for the most part they remain rigidly in force. Thus if the copy book be placed in the usual erect-dexter position the child will twist his head and body to the right ; while if it be placed in the oblique central position he will, or at least he can, sit straight. If, however, the obliquity of the book be excessive, he will twist to the left. Such contortions habitually maintained during hours of study are a well known cause of spinal curvature, and indirectly of myopia.

With regard to the position of the head it was found that in five per cent. the right eye stood nearer to the table than the left, in fifteen per cent. they were equally distant from it, while in the remaining eighty per cent. the left eye stood nearer than the right, the maximum difference being 35 mm. Taking all the cases together the left eye was on the average 9 mm. nearer to the table than the right. The degree to which the eyes were directed upwards or downwards in relation to the plane of the face was also carefully investigated. Supposing the horizontal direction to mean the direction perpendicular to the plane of the face, then the eyes were directed upwards in 6 cases out of 193, amounting to three per cent., while the average direction was 20° downwards.

The foregoing observations agree in some points with those previously made by Weber. Thus, Weber had already noted a perpendicular relation, under certain conditions, between the base line and the downstrokes; but Berlin's investigation was an independent one, and his conclusions were arrived at before Weber's paper had come into his hands. He concludes by discussing certain discrepancies between Weber's observations and his own.

Weber appears to have observed the perpendicular relation of the base line only when the child was writing with care, whereas Berlin found it equally among the careful and the careless, and among the advanced as well as the younger scholars. With regard to the possibility of properly sighting both upstrokes and downstrokes, Berlin holds that this would necessarily involve a rythmical movement of the head. Occasionally a scholar would alter the position of his head very considerably even in writing a single line, using apparently the three distinct modes of sighting his strokes in succession: but no rythmical movement corresponding with upstrokes and downstrokes was ever observable.

The practical outcome of these observations should be, we presume, a change in our present system of teaching writing, namely, that we should place the copy book in an oblique position directly in front of the child, instead of to his right and parallel with the edge of the desk. It is possible that the rounder characters which we employ in England may influence the child's position less powerfully than the angular letters of

German writing, which consist to a much larger extent of slanting straight lines, and that, consequently, a smaller degree of obliquity in the book may be sufficient ; but there can be little doubt that the difference, if any, is one of degree only, and not of principle.

H. COHN (Breslau). **White Slates for the Prevention of Myopia.** *Centralbl. f. prakt. Augenheilkunde*, November, 1882, p. 334.

Excessive convergence of the optic axes is undoubtedly the chief agent in the production of myopia, and the prevention of the malady depends mainly upon keeping the eyes of children and young people sufficiently far from their work during school hours. Each additional centimetre is important.

The disadvantage in this respect of the ordinary school slate is manifest ; its surface is more or less shiny, and the contrast between the letters and the ground on which they are written is unsatisfactory, being much feebler than is presented by black letters on white paper. As a matter of fact, demonstrated by experiments, characters written on a slate must, in order to be equally legible, be placed nearer to the eye than characters of the same size written on white paper with pen and ink, the respective distances being in the proportion of about three to four. Slates have, therefore, in theory at least, been condemned by all who have considered the subject.

Horner in Zurich advised that slates should be entirely banished from the schools, and replaced from the very beginning by pen and ink, in order to counteract the constantly increasing tendency to myopia. Some of the teachers who adopted this advice found advantages from it : noise was diminished ; the attitude of the scholars improved ; care in writing increased, because faults could no longer be erased ; and the teacher could supervise the progress made more easily. But there was no unanimous agreement among the teachers, for it was admitted to be decidedly more difficult to teach the children to begin with pen and ink than with slate and pencil, and for the younger scholars the latter had decided advantages. The school authorities, therefore, regulated the matter only to the extent of requiring the use of pen and ink during the winter half of the year—the darker months.

Cohn, to whose initiative the recent reforms in these matters of ocular-hygiene in schools is largely due, now writes that white artificial slates or tablets and special lead-pencils are being manufactured which will meet the demands both of teachers and oculists. The surface of these slates does not shine, and the writing is readily removed with a sponge. The maker is Emanuel Thieben, in Pilsen (Bohemia); they may also be obtained from Priebatsch, Ring 58, Breslau. The price is stated at 20 to 30 kreuzers (about 5d. to 8d.)

L. DE WECKER (Paris). **Purulent Ophthalmia artificially produced by means of Jequirity.** *Annales d'Oculistique*, July—August, 1882, p. 24.

De Wecker relates that he received from one of his old patients, now in Brazil, a packet of jequirity seeds, with the request that he would test their value as a cure for granular ophthalmia, the patient himself having been cured of a relapse of this complaint by their means. The mode of employing the remedy and its results were given as follows :—

Pulverise 32 of the grains (about 3 grammes by weight) and macerate the product for twenty-four hours in 500 grammes of cold water; then add 500 grammes of hot water; filter immediately after the liquid cools.

The patient is to bathe his eyes with this lotion three times in the day. If the resulting irritation is severe this will be enough; otherwise the bathing must be repeated on the second, and if necessary even on the third day, the same liquid being used. The patient must remain in a dark room for fifteen days.

Some hours after the first application severe irritation of the ocular or palpebral conjunctiva sets in. A sharper inflammation follows the next day; the patient can no longer open his eyes, and the lids are œdematous. A secretion, abundant enough to fall drop by drop if the patient lowers his head, escapes from the angles of the lids.

This period of irritation lasts three days, during which the patient suffers from fever, sleeplessness, headache, and constipation. After the third day the period of suppuration begins and lasts five days. Then the suppuration gradually decreases, and the patient begins to feel a sensible improvement up to the

fifteenth day, when he is finally free from inflammation and cured of his granulations.

Opacities of the cornea disappear from day to day if they exist, which they very frequently do as a result of the irritation produced by the granulations.

De Wecker had already tested the efficiency of a sort of alkaloid prepared from jequirity seeds, but neither by instillations nor by subcutaneous injections was any result obtained. He now experimented again in the manner above described. The conclusions formed were as follows :—

1. Infusion of jequirity affords a means of promptly setting up a purulent or croupous ophthalmia, the intensity of which is greater if the infusion, instead of being used merely as a lotion, is swabbed on the inverted lids and applied in the form of compresses. In the majority of cases the swollen conjunctiva becomes covered with croupous membrane like that sometimes met with in the ophthalmia of new-born children when the secretion coagulates on contact with air.

2. The employment of the infusion is not painful ; purulent conjunctivitis is induced by it as promptly as by inoculation, and with the advantage of avoiding the use of matter borrowed from an individual about whose constitution one can never be quite certain.

3. By moderating the use of the jequirity, the degree of suppuration required may be regulated far more accurately than is possible in inoculation. In the latter proceeding neither the quantity nor the quality of the matter affords any control, whereas with jequirity, if the action is insufficient, it may readily be augmented by a fresh and more energetic application.

Inoculation being a proceeding which is apt to involve too severe an effect, and which is therefore only used in the last extremity, this new remedy is likely to prove very valuable where the prompt production of purulent conjunctivitis is desirable, as in diphtheritic and granular ophthalmia, and inveterate pannus. It has appeared to exert a favourable influence even on the corneal ulcerations which are present in granular ophthalmia, and to be free from the dangers which inoculation would involve under such circumstances.

Jequirity seeds may be obtained from *Rigaud et Dusart, Rue Vivienne*, or from *La Pharmacie Robinet, Rue du Cherche-midi, Paris*. They are extremely hard and demand especial care in pulverising.

A. NIEDEN (Bochum). A Case of Transitory Amaurosis from Carbolic-acid Poisoning. *Berlin Klin. Wochenschrift*, 1882, No. 49.

This is, we believe, the first case of carbolic-acid amaurosis on record.

A man, aged 37, who suffered from infiltration of the apex of the right lung, and later from pleuritic exudation, underwent resection of two carious ribs, the sixth and seventh, on the right side. The resulting fistula was injected daily by his wife with a 2 per cent. solution of carbolic acid from a hand syringe; the fluid returned immediately by the side of the soft catheter introduced into the chest.

Immediately after the first injection, which was made by the surgeon, he complained of a peculiar sweet taste in the mouth, and of a slight confusion in the head. These sensations recurred with more or less intensity after each injection, and sometimes there was also severe headache lasting several hours; but the patient persevered, believing the injections to be doing him good. Nausea or vomiting did not occur. After four months of this treatment he on one occasion requested and obtained a somewhat larger injection of 3 per cent. solution. The amount of carbolic acid entering the chest was apparently less than 3 grammes (45 grains). He immediately uttered a cry and fell from his chair unconscious. For two hours loss of consciousness was complete. The patient flung himself about and uttered loud cries; violent swallowing movements were noted; convulsions were absent, except clonic spasms for a short time in the right upper extremity; pupils widely and equally dilated, and irresponsive to light; respiration irregular, laboured, stertorous; pulse soft, compressible, slow, intermittent; sensation almost completely abolished. Consciousness then gradually returning after the use of cold douche and ether, the patient complained of violent pain in the head, nausea, and loss of sight. Careful testing showed total absence of light-perception. The urine was not examined.

Summoned twelve hours after the commencement of the attack, Nieden found the pupils of medium size, acting slowly to light, promptly with convergence; doubtful perception of strong light; media clear; slight haziness of the disc-margins especially in the right eye, but no other change in the fundus, the vessels being of normal fulness and colour, and no sign either of choking or embolism being present; tension normal; venous pulse produced by finger pressure on the globe; ocular movements normal.

To avoid the possibility of further absorption of the poison the patient was removed to another room, with entire change of clothing. Ice was used externally and internally, together with small doses of strychnia. A favourable prognosis was given. The symptoms subsided gradually, and the sight returned; on the fourth day it was fully restored. There was no opportunity for subsequent examination.

R. DEUTSCHMANN (Göttingen). **Experimental Contribution to the Pathogenesis of Sympathetic Ophthalmitis.** *Von. Gräfe's Archiv.* XXVIII., II., p. 291.

The theory that sympathetic inflammation depends on transmission through the optic nerves, suggested long since by Mackenzie, and recently again advanced by Leber, (*vide* O. R., Vol. I., p. 7), has been impugned lately by an observation published by Becker. He had the opportunity of examining both eyes, both optic nerves, and the chiasma from a case in point. The intracranial portions of the nerves and the chiasma presented no signs of inflammation; choroiditis and retinitis were present in each eye, and there were inflammatory changes in the orbital parts of the nerves, but these latter did not reach to the optic foramina, and were attributable, in Becker's opinion, to ascending neuritis on both sides.

Deutschmann has made a renewed attempt to clear up the matter by experiments on rabbits. Acting on Leber's belief that sympathetic inflammation only follows an infectious septic inflammation in the exciting eye, he introduced septic matter into one eye. This was followed in all cases by destructive suppurative ophthalmitis without any effect on the other eye.

Subsequently he found in the spores of *aspergillus glaucus* (mould fungus) suspended in a $\frac{3}{4}$ per cent. solution of common salt a means of exciting an intense inflammation which yet stopped short of destructive suppuration.

Injections into the trunk of the optic nerve immediately behind the eye were followed immediately by inflammatory changes in the papilla of that eye, and after six to fourteen days by a well marked though moderate papillitis in the second eye ; this in a few days again gave place to the normal appearances. Microscopical examination showed neuritis and perineuritis originating at the point of injection and spreading thence through the commissure to the other nerve.

Injections into the vitreous gave similar results ; purulent inflammation of the vitreous was set up, stopping short of panophthalmitis, and followed in seven or eight days by papillitis in the other eye. Here also a continuous propagation through nerves and commissure was found.

It was clear that the spores did not excite the inflammatory process by germination, for they remained unaltered, and became enclosed in masses of pus-corpuscles and young spindle-cells. To this encapsulation, by which the spores are rendered innocuous, Deutschmann attributes the fact that the sympathetic process may become retrograde.

Although the changes observed in the second eye were not typical of ordinary sympathetic ophthalmitis, the experiments establish the possibility of inflammation being transmitted from one eye to the other through the nerves and commissure.

We may add to this that Pflüger has lately ascertained by means of fluoresceine that fluid injected into one optic nerve readily reaches the opposite retina (*vide* O.R., Vol. I., p. 409). The crucial question is, does sympathetic inflammation begin at the optic disc ?

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, DECEMBER 14TH, 1882.

WILLIAM BOWMAN, F.R.S., President, in the Chair.

REPORTED BY DAWSON WILLIAMS, M.D.

The President, before entering on the proper business of the meeting, made a brief but feeling allusion to the death of Mr. Critchett. The Council, at their meeting on December 14th, unanimously passed the following resolutions: 1. That the Council of the Ophthalmological Society of the United Kingdom desire to record their sense of the great loss sustained by the Society, as well as by the profession at large, in the death of one of their vice-presidents, George Critchett, whose extended reputation, at home and abroad, rested on the solid foundation of important services rendered to that department of the medical art to which he was chiefly devoted, and whose kindness of heart and excellent judgment were universally recognised and esteemed. 2. That a copy of the foregoing resolution be forwarded to Mr. A. Critchett, with an expression of the cordial sympathy of the Council, on the part of the Society.

Hydatid Tumor of Orbit.—Mr. P. H. Mules showed a hydatid cyst the size of a pigeon's egg. The patient was a boy, aged 6 years; the growth was difficult to diagnose, and was treated by free incision and drainage-tubes; the cyst was discharged on the seventh day. Before this, however, a condition of choked disc supervened, which interfered with the perfect recovery of vision; but, six months after the removal of the cyst, he could read J. 1.

Mr. Jonathan Hutchinson inquired whether any echinococci were found, as otherwise the nature of the cyst might be regarded as doubtful.

Dr. Stephen Mackenzie thought the peculiar laminated nature of the membrane as conclusive as the presence of echinococci; the hydatid might be a barren cyst.

The President asked why the cyst had not been removed at once; was it very firmly adherent? It was in all cases

desirable to avoid suppuration within the orbit; its consequences could not always be foreseen, and might be serious.

Mr. Milles said that, in a case of hydatid of the orbit lately treated at the Moorfields Ophthalmic Hospital, the whole cyst was removed with ease, and the wound healed in a few days.

Mr. Mules replied that the cyst was attached very firmly to the apex of the orbit, and he had not thought it prudent to attempt to tear it away.

Panophthalmitis.—Mr. Mules related the case of a patient who had undergone, two years and three months earlier, an operation for glaucoma, which left a cystoid cicatrix. A panophthalmitis, which he attributed to septic absorption through the faulty cicatrix, destroyed the eye within twenty-four hours of the first symptom of purulent infection.

Mr. Priestley Smith mentioned the case of an elderly lady, whose eye, two years after a successful cataract extraction, was lost through rapid painless panophthalmitis. The suppuration appeared to begin at one extremity of the cicatrix, where there was a minute black spot representing an incarceration of the iris. He had been at a loss to explain the occurrence until he discovered behind the ear a patch of eczema with profuse offensive discharge. The attendant volunteered the statement that the patient frequently touched the part, and frequently rubbed the eye. At the recent Heidelberg Congress such accidents had been attributed by Arlt and Leber to septic inoculation of a cystoid cicatrix.

Mr. Brudenell Carter had met with a case of panophthalmitis in a patient, on whom he had operated three years previously for glaucoma; the eye had recently been rapidly destroyed by suppuration; in this case there was no evidence of inoculation, and the inflammation did not seem to have started from the cicatrix, which was not cystoid.

Necrosis, and Spontaneous Separation of a large ivory Exostosis of the Orbit.—Mr. H. A. Lediard showed the portrait of a patient with a large ivory exostosis of the left orbit, and also the exostosis itself. The tumour was stated to have been about the size of a pea at birth, and was situated between the upper eyelid and the eyebrow. It gradually enlarged, and, at the age of nine years, induced destruction and rupture of the

globe of the eye. The tumour ceased to enlarge at about twenty-five years of age, and, about two years later, the skin, which had hitherto covered it, suddenly gave way. The patient was admitted into the Carnarvonshire and Anglesey Infirmary, under the care of Mr. Hughes, in 1870. He was then thirty-three years old, a sailor, and in good health. The tumour seemed to arise from the cavity of the left orbit; it was of stony hardness, irregularly pyramidal in shape, nodulated on the surface, and measured 4·5 by 5 inches; it was then moveable, and, whilst under observation, gradually became looser; an offensive discharge issued from the base; finally, about a month later, the whole mass became suddenly detached, without any associated pain or hæmorrhage. The tumour was pediculated, and weighed 2·25 ounces. The neck also was much enlarged, the anterior and lateral portions being of stony hardness, the left side being on this account much larger than the right; the girth of the neck was 17·5 inches, and of this a space of 10 inches was of stony hardness. In October, 1882, the patient survived, was in good health, and master of a vessel. The vision of the right eye remained good. Mr. Lediard referred to other recorded cases. Mr. Hilton describes (Guy's Hospital Reports, 1836) a very similar case, where the exostosis (which weighed 14·75 ounces) became spontaneously detached. In a case recorded by Mr. Hutchinson (Illustrations of Clinical Surgery,) and under his care jointly with Mr. Borlase Child in 1859, the exostosis, which was of large size, and appeared to spring from the frontal sinus, also became necrosed. Sir James Paget (Surgical Pathology) mentions another case of large ivory exostosis in the orbit, which projected not only forwards, but also backwards into the skull. Mr. Lediard showed a photograph of the skull in this case which had been sent to him by Professor Humphry of Cambridge. Boyer had referred to spontaneous necrosis of ivory exostosis, and had remarked on the fortunate nature of the process.

Mr. Jonathan Hutchinson thought that there was one clinical lesson to be learnt with regard to these exostoses; it was that they had narrow pedicles, and that it was therefore justifiable to operate at an early stage. In the case referred to as recorded by himself, an hour had been spent in sawing through the mass, which was then firmly attached; a year

later the exostosis had become detached by necrosis, and shelled out with ease, leaving an enormous cavity, in which the dura-mater was exposed; the patient made a good recovery. From an examination of this case, and of several other smaller instances, he had come to the conclusion that the pedicle of these exostosis was generally narrow, and might be wrenched off.

The President remembered a case of ivory exostosis of the orbit which he had been able to get away by prising it up. The base was small. He had been struck by the slight adhesion of the membrane covering the tumour, which had easily shelled off.

Dr. C. E. Fitzgerald referred to a specimen in the Museum of the Trinity College Medical School, in Dublin, which resembled the one in the Museum at Cambridge very closely; an inspection of it had on one occasion deterred him from operation.

The President remarked that the danger of using force could only apply to tumours attached to the roof of the orbit.

Chancre of Inner Canthus.—The Secretary read, for Mr. Simeon Snell, particulars of a case occurring in a nurse-girl, aged 21, who had under special charge a syphilitic baby of five months. The chancre was noticed some few weeks as a pimple, before the girl came under observation on August 15th, 1882. It then involved the caruncle and adjacent conjunctiva, as well as the integument of the commissure and the lids. A point of interest and diagnostic value was the presence of well marked induration of the preauricular and submaxillary glands. Other symptoms were a papular coppery rash and alopecia, ulcerated throat, and, later on, mucous tubercles of the vulvæ. The chancre healed, with hardly appreciable deformity.

Mr. Brudenell Carter had recently seen two cases of chancre on the eyelid, in a boy and a girl respectively, and in neither had he been able to trace the source of infection.

Dr. C. E. Fitzgerald remembered to have seen one case in Paris; the patient was a young girl, and the disease had been attributed to certain reprehensible practices common in that city.

Mr. McHardy believed that the habit of removing foreign bodies from the eye with the tongue might account for some of these inoculations ; he confessed, however, that though he had seen four or five cases, he had never been able to trace the infection to this cause.

Mr. J. E. Adams referred to the case exhibited by him at this meeting (see below), in which inoculation had been brought about by the kisses of an infected child ; he thought that this was probably a common mode of infection.

Mr. Solomon confirmed this opinion, and related the case of an infant infected on the eyelid by its aunt who had a sore on the mouth.

Stationary Tobacco-Amblyopia in a Man subsequently affected by Diabetes.—Mr. J. B. Lawford related this case. The patient was forty-six years of age ; he had always been a heavy smoker. His sight had begun to fail about seven years ago, and symptoms supervened about nine months ago ; but his sight had not deteriorated, though the diabetes had grown steadily worse. Vision was very defective, and there was a well marked central scotoma for red. The optic discs were a little pale, but the ophthalmoscope revealed no other morbid state.

Double Amblyopia, with well marked Central Scotoma for Red and Green.—Mr. Stanford Morton communicated a case of the above, in a man aged 34, accustomed to smoke very moderately, and who was suffering from diabetes. The patient was not under care long enough (barely two months) for the result as to sight to be known.

Central Amblyopia in Diabetes.—Dr. Edmunds and Mr. Nettleship.—The paper contained notes of four cases of central amblyopia without ophthalmoscopic changes, in patients suffering from diabetes. 1. A man, aged 40, who had suffered from diabetes for several months. He smoked half an ounce of tobacco a day. Failure of sight had been noticed for one month. Vision in each eye $\frac{20}{100}$, letters 14 J. (corrected). Under treatment for diabetes health improved, but not vision. He would not, however, stop smoking. 2. A man, aged 38, had had diabetes three or four years. He smoked half an ounce of strong tobacco daily. Failure of sight had been noticed for five months. Vision in each eye $\frac{5}{200}$, and 14 J. He died in the country three months later. 3. A male, aged 48, had been

the subject of diabetes during twenty-one months. He had smoked, during the last thirty years, three-quarters of an ounce of tobacco a day. He had experienced failure of sight for five weeks. Vision was $\frac{20}{100}$, and 8 J. 4. A man aged 58, a moderate smoker, complained that his sight had been failing for eighteen months. Vision in each eye $\frac{20}{200}$, and 16 J. His urine, on examination, was found to contain sugar. Nine cases were referred to by the authors (including published ones) of failure of sight with central scotoma, in the subjects of diabetes, without ophthalmoscopic changes. The coincidence would seem to be fairly common. Most of the patients were smokers, some of them great smokers; and it was not yet certain whether diabetes acted alone, or only as a predisposing cause to tobacco-amblyopia. The analogy of double amblyopia to the symmetrical neuralgia in diabetes, described by Worms and Buzzard, was pointed out.

Dr. Stephen Mackenzie said that the subject raised illustrated the usefulness of the Society. The discussion would lead physicians to look with more care for slight defects of vision in diabetic patients. In his own practice he had only met with two instances of amblyopia in diabetes, and one, if not both, of the patients were women.

Mr. Priestley Smith said that the sections which had been exhibited by Mr. Nettleship and Dr. Edmunds, by Dr. Samelsohn, and now by Mr. Lawford, proved that typical central amblyopia is the expression of axial inflammation of the optic nerve in the orbit. It was very remarkable that the process should particularly select the orbital portion of the nerve, and only the central bundles; but Samelsohn had given a good hypothesis to explain it. (*Vide* O. R., vol. i., p. 310.) The nutrient vessels of the optic nerve ramify from the surface, towards the axis, so that the richest capillary plexuses and the most active nutrient changes would be at the centre of the nerve, which accords well with the fact that the central fibres which pass to the yellow-spot region are functionally the most important. In other organs in which we meet with interstitial inflammation—*e.g.*, kidney and liver—the vessels ramify from the centre towards the surface, and in these the inflammatory changes occur first and worst near the surface. With regard to the selection of the orbital part of the nerve, Samelsohn

points to the intimate vascular connections between the skin of the face and the orbit, and maintains that one frequent cause of retro-bulbar neuritis is sudden chill to the face. The speaker had had under care a case of central amblyopia which was directly referable to tennis-playing. The patient, a young man of about 18, complained of something wrong with his sight whenever he played lawn-tennis; ultimately a typical central-colour scotoma was developed in one eye, with some pain on movement of the eye. Tobacco, alcohol, and diabetes were here definitely excluded. The only peculiarity was a strong tendency to flushing of the face. The case was apparently one of retro-bulbar neuritis, due to chilling of the over-heated face. This suggested that even when a definite constitutional cause is present, such as tobacco, alcohol, etc., cold is very likely an exciting or auxiliary cause, and that in treating such cases protection against cold is of considerable importance.

Sequel to a Case of Optic Neuritis (reported by Mr. Stanford Morton in the Society's Transactions, vol. i.).—Dr. Samuel West said that the patient came under Mr. Morton's care in January, 1881. Vision was then perfect, but both discs were greatly swollen. In the following month, she consulted Dr. West for headache and for sudden temporary attacks of blindness. Vision began to fail in June, 1881; right eye $\frac{20}{30}$, field much contracted, headache worse. At the end of July, 1881, the right eye was completely blind, the left defective. She was actively treated with mercury and iodide of potassium on several occasions, but without good result. In September, 1881, she was completely blind of both eyes. The swelling of the disc remained. Atrophy gradually ensued, and in August, 1882, the discs were quite white and atrophic; the pupils did not react to light, but freely to movements of the eyeball; the eyes diverged. The condition was probably secondary to some tumour of the brain, possibly tubercular, which had become stationary or retrogressive; but the diagnosis was difficult. The case was of interest, owing to the persistence of perfect vision for about five months, in the presence of extreme optic neuritis, to the attacks of temporary complete blindness, to the rapidity with which the failure of vision became absolute when once it commenced, and to the entire absence of any symptoms beyond the eye-changes.

Tortuosity of Retinal Vessels.—Dr. Stephen Mackenzie showed a drawing of the optic disc of a patient, aged 20, who was suffering from severe vesicular emphysema, œdema of the legs, and lividity. The veins in the fundus of both eyes were extremely tortuous, dark, and somewhat dilated. This condition of the veins would perhaps have been attributed to the venous obstruction consequent on the emphysema, but for the cases recorded by Messrs. Nettleship and Benson, where the condition was noticed in otherwise healthy subjects.

The President remarked that he had occasionally seen patients, generally women, in whom the episcleral vessels were much dilated, or even varicose. The functions of the eye appeared to be natural. In some of these cases, glaucoma had supervened some years later, and he had held off from operating owing to a fear of hæmorrhage; but the result of iridectomy showed this fear to have been unfounded. In some of these cases, there was, he believed, an enlarged condition of the retinal vessels.

Living and Card Specimens :

Optic Nerve from a Case of Amblyopia in Diabetes.—Microscopical sections were shown by Dr. Edmunds and Mr. Lawford. The patient had been a hard smoker, and sight had been failing for about four months. No ophthalmoscopic changes were detected. He died of diabetes. Sections of the optic nerve showed changes limited to a group of fibres which extended through the length of the nerve; the change consisted in a thickening of the connective tissue with degeneration of the nerve-fibres.

Chronic Membranous Conjunctivitis.—Mr. Juler showed again the patient who had been exhibited to the Society at its last meeting. (*Vide O. R.*, vol. i., p. 384.) The right eye had recovered under the use of lapis divinus, but the disease had extended in the left.

Chancere of the Upper Lid.—The patient was under the care of Mr. J. E. Adams. There was an indolent shallow ulcer, with surrounding thickening, on the under surface of the upper lid of the left eye, near the outer canthus, and a very marked glandular enlargement on the same side. The disease was as yet in too early a stage to allow of an absolute diagnosis; no secondary symptom had appeared.

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OPERATIONS FOR TRICHIASIS AND ENTROPIUM.

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Probably more operations have been invented for the cure of inversion of the eyelids than for that of any other abnormal condition of the human frame, and the effect of a glance over the literature of the subject is perfectly bewildering. We may, however, conclude from the number of operations advocated that none of them is perfectly satisfactory in all cases, and, in the present chaotic condition of the literature of the subject, it will be a useful employment to ascertain if there are any canons by which the comparative values of operations may be estimated before submitting them to the test of direct experiment.

No matter what may be the original cause of the malposition, whether an excess of skin or a deficiency of conjunctiva, whether an abnormal contraction of the orbicularis, or an altered curvature of the tarsus, it must be recognised that it is the friction of the cilia upon the cornea that produces the mischief, and that it is only by the removal of this friction that a cure can be effected. It may then be laid down as a necessary condition of a good operation that it shall for once and for all effectively remove the cilia from their abnormal position. There must be no cicatrices left by it to reproduce the inversion by their contraction; and, on the other hand,

there should be no indefinitely continued contraction in the opposite direction to cause either excessive eversion or shortening of the lid. All cicatrices should follow the direction of the muscular bundles, in this conforming to the general rules of all surgical operations. No tissue should be unnecessarily excised, more especially as in most cases of trichiasis and entropium every structure in the lid, with the possible exception of the skin, is either atrophied or contracted. I have never seen a case in which simple redundancy of skin had produced inversion, and I have never been able to produce any effect upon the relative position of the cilia and the cornea by drawing the skin of a healthy lid downwards, so that even if we had not ample proof from experience of their bad effects we could positively assert that any such procedure as excision or cauterisation of the skin would be useless for the cure of entropium. Indeed I have frequently seen lagophthalmos so produced, and the entropium left unaltered. If it is inadvisable to remove any of the possibly redundant skin, it must be still more injudicious to remove any portion of the defective tarsus or conjunctiva: neither can well be spared, and their removal involves glandular structures, which, though partially atrophied, may be of essential use to the mucous membrane. Finally, a good operation should not produce any deformity or ugly scar, and should not, if unsuccessful, render the patient's condition worse by making a second operation difficult or perhaps impossible.

Those cases of partial trichiasis where only a few hairs are misplaced do not require much consideration. If the cilia are long and stout the ancient operation of *illaqueatio*, revived by Snellen about a quarter of a century ago, meets all the demands of the case, and if the cilia are too atrophic to bear this procedure it is best to destroy them entirely by electrolysis, as proposed by Arthur Bensen, at the British Medical Association Meeting, Sept., 1882. I have had considerable ex-

perience of this method, and am much pleased with its action in suitable cases. There are, it is true, several other means of attaining the same end at our disposal. In Mackenzie's classical work (French translation, 1857), the use of caustics on needles, the actual and electric cautery, and Berlinghieris' elaborate process of epilation, are all described in this connection. But it is highly improbable that anyone nowadays will undertake the latter operation, and the other proposals are so manifestly inferior to the plan advocated by Dr. Benson that it may be safely prognosticated that electrolysis will be the means universally adopted in future to radically destroy misplaced cilia.

Many cases, however, of partial trichiasis, as well as the cases of complete trichiasis and entropium, cannot be satisfactorily dealt with by illaqueatio or electrolysis, and for these numerous operations have been proposed. In Mackenzie's work alone there are, in addition to the palliative treatment of mere epilation and the barbarity of destroying both skin and cilia by chemical action, somewhere about twenty different operations described, and there have been at least as many more invented or re-invented in the last quarter of a century. The mere description of many of these methods is sufficient to condemn them in the eyes of a rational surgeon; but it will be useful to submit the more important ones to a somewhat detailed criticism.

The bad effects of simple excision or cauterisation of the skin have been already alluded to, but there is one other operation which leads to even more disastrous results, viz., the amputation of the whole border of the lid, skin, orbicularis, cilia, tarsus, and conjunctiva. This was much practised by my predecessor, the late Sir William Wilde, at one period of his career, and was a frequent source of xerophthalmia. Indeed all the cases of xerophthalmia I have seen were occasioned in this way.

Neglecting these glaringly erroneous procedures we may divide the operations into those in which a portion of tissue, skin, or tarsus, or both, is removed, and those which attempt to effect a cure without loss of substance. Of the former, F. Jæger's or Flarer's excision of the cilia without touching the tarsus is the most radical; but though I have seen beneficial results from it I cannot recommend it, as it produces very unsightly deformity, and leaves the eye without the protection it normally receives from the eyelashes.

Crampton's operation, as modified by Guthrie, deserves mention as that which was probably most frequently used in Great Britain at least, during the earlier part of the present century. It must, however, have been very often unsuccessful, for, seldom as it is done nowadays, I have seen several cases where it had failed in the hands of able operators; and it is open to the double objection that the lid is permanently shortened by the excision of a piece of skin, and that considerable deformity invariably results. Saunders' excision of the whole tarsus, revived afterwards by Pope, need only be mentioned as an instance of the extremes to which surgeons were driven by the unsatisfactory nature of Crampton's operation.

The operation of Anagnostakis for partial trichiasis, though probably a radical cure, produces such marked deformity that no patient with a proper sense of the value of personal appearance will lightly consent to it. However, this surgeon, in the method he proposes for general trichiasis, is one of the first to recognise the importance of not removing any of the so oft maltreated papebral skin, and deserves credit too for his acuteness in perceiving that if the ciliary border is to be permanently raised by sutures it must be attached to some more fixed and rigid support than the skin. This operation is one of those in which no tissue is removed, but depending as it does merely on the contraction of vertical cicatrices it is very uncertain in its results,

and cannot be recommended as a substitute for the more certain methods which have been proposed by others.

The great step in advance in modern times is Arlt's modification of Jæschke's transplantation of the ciliary border. This has been itself modified by various surgeons, noticeably by von Graefe, and has probably up to this time done more service to suffering humanity than any other operation of the kind. It has, however, the disadvantages that even in skilled hands it is not universally successful, that it permanently shortens the lid—even sometimes producing lagophthalmos, and consequently renders any subsequent operation extremely difficult to execute.

Streatfield's grooving of the tarsus cannot of itself effect a cure in severe cases, and it was naturally to be expected that some one would combine it with Arlt's transplantation, as Soelberg Wells has done. Whatever objections apply to these methods apply also to Snellen's somewhat similar proceeding, and Berlin's amplification of Desmarre's old excision of a piece of the tarsus. In all of them either no cure is effected or it is only attained by the loss of valuable tissue, and in none of them is there any really effective precaution taken to prevent a return of the inversion, while a subsequent operation is rendered difficult by the dense cicatrices which remain.

The elaborate triangular operation of von Graefe does not commend itself as a practical proceeding, and, in addition to producing an ugly cicatrix, it removes both skin and tarsus, neither of which, in my opinion, can be well spared.

The sutures advocated by Gaillard, and, combined with canthoplasty by Williams and Pagenstecher, produce great deformity, and do not cure inversion. The sutures of Herzenstein and Snellen are open to similar objections. Indeed it may be predicated of all this class of operations that they are only serviceable in

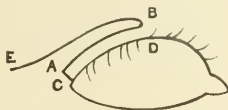
very insignificant cases, and have never been adopted by any operator living where entropium is at all common.

Before proceeding to describe Spencer Watson's operation, and those to which it has given birth, I must allude to the attempts made almost simultaneously by Wecker (Klin. Monatsbl., f. Augenh., Apr., 1879), and Bauchon (reported by Warlomont in the *Annales d'Oculistique*, vol. lxxxi., p. 146) to transplant the ciliary border without excision of skin. This is done by combining the intermarginal incision of Flarer with Gaillard's sutures. I have performed this operation several times, and my opinion of it quite coincides with Warlomont's. If a permanent cure is effected, as is not always the case, it is only by the production of unsightly vertical cicatrices, which the patients will never forgive nor the oculist forget.

The operation proposed by Warlomont himself, (*Annales d'Oculistique*, vol. lxxi., p. 221), an improved form of transplantation, in which the ciliary border is not sutured merely to the skin, but to the upper edge and surface of the tarsus, as in the operation of Anagnostakis, is probably the best operation before the world, with the exception of the latest modification of Spencer Watson's, to be described presently. In less serious cases Warlomont used to perform a sort of combination of Anagnostakis and Gaillard's sutures, with which we need not concern ourselves more particularly, as it is manifestly applicable to only very mild cases.

Up to this time all the plans adopted to effect a permanent cure attempted to prevent reinversion of the cilia by attaching them to more or less fixed points above, but in 1873 (*Royal Ophthalmic Hospital Reports*, vii., p. 440) the happy idea occurred to Spencer Watson of obtaining the same end by giving the transplanted tissue a firm support from below. This he effected by transplanting a piece of skin from above to fill up the place left exposed by the elevation of the ciliary border

(*vide* diagram). In 1873 Watson had only tried this method in cases of partial trichiasis, although he suggested its use also in cases of complete trichiasis,



SPENCER WATSON'S OPERATION FOR PARTIAL TRICHIASIS.

The lid is split into two layers in the ordinary way from C to D. The small skin flap E B A is then formed, and the incision A C made down to the first intermarginal cut. The skin flap and the ciliary border are then made to change places, and a few fine sutures applied to keep them in their new positions.

altering the form of the flaps according to the character of the case; but in the next year he reported a case of complete distichiasis operated on by this plan (*Medical Times and Gazette*, vol. xlix., p. 546). In it he made at each end of the lid both a ciliary flap and a skin flap, the ciliary flaps having their bases at the centre of the lid, and the skin flaps theirs at the extremities. I have practised these operations of Mr. Watson since June, 1879, both for partial and complete trichiasis and entropium; but I have always divided the operations in these latter cases into two periods, and allowed an interval of some days to elapse between the transplantation of the outer and inner halves of the ciliary border.

The objections that may be brought against the method are, that it requires a tedious dissection; the flaps—more especially the skin flaps—may slough; that the skin flap remaining in contact with the cornea, as it usually does, may affect the transparency of the latter, and that an ugly deformity results from the solution of continuity in the ciliary border. But the dissection, though requiring some nicety of manipulation, is not more troublesome than in any other of the better class of entropium operations, and in the latest modification, to be described presently, it is still less complicated.

The flaps, it is true, may slough; but some such accident may occur in any operation, and if the ciliary flap sloughs there can be no return of the disease, while if the skin flap sloughs you are no worse off than after Arlt's transplantation. Indeed, if you add Anagnostakis' sutures so as to fix the ciliary flap to the tarsus, and not only to the skin, it becomes an impossibility for inversion to recur. Watson saw the danger of sloughing, and advised the skin flap not to be completely dissected up from the tissue beneath, but to be transferred to its new position by gliding, and this precaution should be adopted in doing this operation or any of its modifications. At first sight it might indeed seem probable that the cornea would resent the contact with the external skin, but experience has shown that this is not the case. I have never seen the slightest irritation produced, and indeed have always found it extremely difficult to distinguish the transplanted skin from ordinary mucous membrane after the lapse of a few weeks. The same observation has been made by Nicati, and to my mind this fact, looked at from a physiological point of view, is one of the most interesting things connected with entropium operations. It is of course well known that this is not the first attempt in surgery to get ordinary cutis to perform some of the functions of mucous membrane. All the operations for extroversion of the bladder are instances in point. As to the deformity, it is considerable no doubt; but I had not been long practising the operation before I succeeded in obviating it completely by the simple device of leaving the ciliary flap attached to the lid at both its extremities, and passing the skin flap under it through the sort of button-hole formed between it and the tarsus. This last device forms one of the improvements in the latest and decidedly the best modification of the operation, which is described by Dianoux in the *Annales d'Oculistique*, Sept., 1882. From Dianoux's paper it is difficult to ascertain who is the originator of the method he uses,

whether Gayet, Warlomont, or himself; but he describes it as a deduction from the explanations of Gayet's procedure given by Warlomont. In it both flaps, skin and ciliary, are left attached at their extremities, and the centre of the skin flap is pulled down with a forceps underneath the ciliary flap, to be attached by sutures to the lower free edge of the tarsus, three sutures being usually sufficient, one in the centre and one at each end.

(I indeed have found the two extreme ones sufficient.) It is needless to state that the skin flap must be proportionately long to allow of its stretching so far below its original position. It should not be of a much greater width than 3 mm. Of course the ciliary flap should be attached by two or three sutures to the structures above it, either to the skin alone or, if you fear sloughing of the skin flap, to the tarsus also, as is recommended by Dianoux. I have as yet only performed this modification upon three eyelids, and assisted at a similar operation in a fourth case; but I have every reason to be satisfied with the results, and I am confident that it will be the method used in future for the treatment of all really severe cases. It is very interesting to watch the rapidity with which the raw under surface of the ciliary flap adheres to the upper cutaneous surface of the skin flap pulled beneath it at its extremities. After three days it is impossible to pass a probe between their surfaces, and after a few weeks it becomes a matter of careful observation to discover that any operation whatsoever has been performed, so slight and insignificant is the deformity produced.

It would be tedious to describe all the operations which have been proposed for entropium and trichiasis during the last decade; most of them are only trivial modifications of well-known methods, and have not even novelty to render them attractive. In 1879, however, Hotz, of Chicago, described an operation (*Archives of Ophthalmology*, viii., p. 249) which is in some respects an improvement upon that of Anagnostakis,

inasmuch as he includes the upper edge of the skin incision in the sutures, and does not allow the latter to cut their way out and produce cicatrices, but effects immediate union. The only other point in which his operation differs from that of Anagnostakis is in the primary skin incision, which Hotz makes along the upper curved edge of the tarsus, instead of immediately above the hair bulbs, as Anagnostakis places it. Like the latter, he saw the futility of attempting to obtain a permanent support for the cilia by attaching the lid border to the skin alone, and he included the upper edge of the tarsus in his sutures. Hotz seems to have had very good results from his operation, and he expresses his astonishment that the previously published method of Anagnostakis had met with so little recognition among both German and English oculists.

Nicati's *marginoplastie palpébrale* (Nagel's *Jahresbuch* 1878, p. 384) is simply Spencer Watson's. Gayet's operation, described at the International Medical Congress in Amsterdam, Sept., 1879, is exactly the same operation as Nicati's, published in the preceding year, and of course another *fac-simile* of Spencer Watson's published more than six years previously. Gayet's experience of the method at that time must have been very limited, as he had only three successful cases to report to the Congress. He notices the bad cosmetic result of this operation, which first induced me to leave the ciliary flap attached at both its ends to the rest of the lid. It is very remarkable, and not altogether creditable to European oculists, that M. Gayet seems everywhere to have the credit of being the originator of this special form of transplantation. At Amsterdam, in 1879, no one disputed his priority, and in 1882, at Eisenach, no one in the ophthalmological section except myself, seemed to have any knowledge of the operation, although a full account of it is given in Nagel's *Jahresbuch* for 1873. The discussion upon entropium operations at Eisenach (*O. R.*, vol. i., p. 412) was chiefly

remarkable for the uniformity exhibited by the oculists present in the means they adopted to prevent reinversion. Nearly all those who spoke adopted the plan of supporting the ciliary flap by pieces of skin placed below it—that is following out the idea which Spencer Watson was the first to propose to the world. One oculist stated that he placed the whole piece of skin excised in Arlt's translation upon the raw surface beneath the ciliary flap, treating it as Wolfe does the skin he transports without pedicle, and that it generally lived. Waldhauer used the same piece of skin to form small skin grafts, which he also placed upon the denuded tarsus. The end he attains by the skin grafts can be, I consider, more certainly reached by the flap of Dianoux, which has been described above; but Waldhauer's recognition of the value of skin support from below to the ciliary flap is most important, for few European oculists have had anything like the same experience of entropium operations as he has had. I know that in the four weeks succeeding the Eisenach Congress he performed his operation twenty-five times, a number which speaks for itself. Schoeler, too, of Berlin, has also adopted the idea, for he performs in partial trichiasis an operation which is exactly the same as that described by Spencer Watson (Nagel's *Jahresbuch* 1880, p. 405). I consider this singular agreement as one of the most convincing arguments which could be adduced in favour of Spencer Watson's original idea, which must be regarded as the direct historical and logical antecedent to the most perfectly developed type of entropium operation now existing—namely, that described by Dianoux.

TWO INSTANCES OF HEREDITY.

BY P. H. MULES, M.D.,

SURGEON TO THE MANCHESTER ROYAL EYE HOSPITAL.

HEREDITARY TRANSMISSION OF ECTOPIA LENTIS.

T. L., a man aged 24, came to the Hospital suffering from congenital displacement of both lenses. On examination the *right* lens was found to be displaced downwards and inwards, the *left* directly inwards.

The family history, given by the young man and corroborated by his mother, is as follows :—

The patient's father, now deceased, suffered from the same affection of the eyes as the patient.

The patient's mother (examined) is a singularly intelligent woman, and has normal eyes.

By this union there have been ten children, viz. :—

First child, died at 5 weeks old.

Second, the patient, now aged 24, has displacement of both lenses.

Third, died at $5\frac{1}{2}$ years, is said to have had displaced lenses.

Fourth and Fifth, died in infancy, under 2 years ; in both the eyes were “queer.”

Sixth, died at $5\frac{1}{2}$ years, is said to have had displaced lenses.

Seventh, died at $17\frac{1}{2}$ years ; is said to have had displaced lenses, just like the father.

Eighth, died at 11 months ; the eyes were said by a medical man to be affected like those of the other children.

Ninth, died at 3 weeks.

Tenth, now alive, aged 13 (examined) ; both lenses displaced below the pupil.

Since the death of the father of these ten children, the mother has married again. By the second marriage there are three perfect children, all alive and well.

HEREDITARY TRANSMISSION OF GLAUCOMA.

W. K., a man aged 49, came to the Hospital in March, 1880.

Right eye: $V = \frac{6}{18}$; $T + 1$; field uniformly contracted to about half its normal size; refraction myopic, but no glass improves; well marked excavation of optic disc.

Left eye normal.

J. K., eldest son of the above, aged 18, came to the Hospital in January, 1881.

Right eye: $V = \frac{6}{6}$; $T +$; field slightly contracted; no excavation of disc.

Left eye: $V =$ shadows; deep excavation of disc.

T. K., second son, aged $16\frac{1}{2}$.

Right eye: $V =$ shadows; $T + 1$; excavation of disc.

Left eye normal.

R. K., third son, aged 15.

Both eyes: slight myopia, viz.: 75 D.; $V = \frac{6}{9}$; $T +$; no excavation of discs; fields normal.

In none of these cases was there any corneal lesion; the media were perfectly clear, and the changes in the fundus extremely well seen. No signs of any inflammatory changes were to be seen, and not one of the patients had at any time suffered pain or any other trouble connected with the eyes besides the failure of sight. So far as could be determined the cases were examples of the purest type of simple glaucoma.

It is to be noted that in both of the foregoing examples of inherited defect the father was in fault.

DE WECKER & MASSELON (Paris). An Astigmometer.

Annales d'Oculistique, July—August, 1882, p. 44.

When a square of white cardboard is held in front of an eye with non-astigmatic cornea the corneal image, as viewed through a hole in the centre of the card, is an exact square. In corneal astigmatism the image deviates from the perfect square more or less according to the degree of asymmetry in the cornea, and in the case of regular astigmatism the deviation is

regular in form. The square becomes elongated; it is rectangular when its sides correspond in direction with the principal meridians of the cornea; it ceases to be rectangular when they do not so correspond. The astigmometer of De Wecker and Masselon acts on this principle.

The instrument consists of a square of blackened metal with white margins, having a round aperture at its centre, and supported in the vertical position by a handle on which it rotates around its centre; the angle at which it stands can be read on a graduated circle on its posterior surface. Placing the patient with his back to the light the observer holds the astigmometer in front of the eye to be examined, and parallel with the plane of the patient's face, at about 20 cm. (8 inches) from it. The patient "fixes" the central aperture, and the observer, looking through the latter, views the white square reflected in the cornea. At the distance named the side of the image is rather less than one-third of the corneal diameter.

If the image is exactly square there is no corneal astigmatism. If it is elongated the observer rotates the square, when necessary, until the image is exactly rectangular; its position then corresponds with the meridians of maximum and minimum curvature in the cornea, and is read off from the graduated circle. For the determination of the amount of the astigmatism a small scale is provided, on which are figured a series of oblongs, showing the size and shape of the image corresponding to each degree of astigmatism from 1 to 10 dioptrics. This is held by the side of the eye and compared with the image actually produced.

When the image is unsymmetrical and cannot be brought to the rectangular form the astigmatism is irregular. Even then, however, a position may be found in which two sides are parallel, and with this indication a cylinder may sometimes be applied with considerable increase of acuity.

In conical cornea the sides of the image are more or less equal, but are incurved, being convex towards the centre; here the employment of a cylinder is useless.

It is claimed that the instrument is especially useful in detecting astigmatism after cataract extraction, and in children too young to give accurate replies. It is made by Crètès, of

Paris. The price is not stated. Any comparison between this astigmometer and the ophthalmometer of Javal and Schiøtz (*vide* O. R., vol. i., p. 38) must obviously be one of portability and cheapness in the one, and precision in the other.

J. ALBRECHT (Zurich). **Statistical Contributions to the Study of Myopia.** *Klin. Monatsblätter f. Augenheilkunde*, October, 1882, p. 342.

The author has carefully worked out certain points connected with myopia, from records of cases occurring in the private practice of Prof. Horner during the years 1875—9. The recorded observations, having been made without reference to any special research, and having been all confirmed by two or three observers, afford trustworthy material for the purpose.

The Degree of Myopia in the Two Eyes respectively.—After exclusion of complications, 1,638 cases remained for examination. In 40 per cent., belonging about equally to both sexes and all ages, the myopia was equal in the two eyes; in 60 per cent. it was different. Among the latter the right eye was the more myopic in 60 per cent., the left eye in 40 per cent.

Difference in the Degree of Myopia on Subjective and Objective Examination.—This point was determined from 940 cases which had been examined both subjectively by glasses and objectively by the ophthalmoscope. In 50 per cent. of these, both methods gave the same result. In 35 per cent. the examination by glasses showed in both eyes a higher myopia than that by the ophthalmoscope; the reverse was noted in only about 3 per cent. (30 cases), and these cases were almost exclusively characterised by greatly reduced acuity, which will well explain the discrepancy. In the remaining 12 per cent. the two eyes respectively gave different results with regard to this question. These cases, therefore, need not be included. Omitting these latter, and considering the fact that, in many others, the recorded difference was less than $M_{\frac{1}{40}}$, which is practically unimportant, it may be said that the two modes of examination gave a similar result in 75 per cent. of the cases. In the remainder, the

difference varied mostly between $\frac{1}{20}$ and $\frac{1}{40}$, in a few it was higher. The differences were most frequent in the younger patients, which justifies the assumption that accommodative effort, present during the subjective, absent during the objective examination, was the cause. Hence it would appear that, in cases where no great discrepancy arises from the double examination, treatment of the myopia by atropine is uncalled for, since the desired relaxation will be obtained simply by rest of the eyes; but that, where the discrepancy is considerable, atropine should be employed for the suppression of the accommodative spasm, which would otherwise be obtained only at the expense of much loss of time.

The Frequency of Staphyloma Posticum in High Degrees of Myopia.—The presence or absence of staphyloma posticum was expressly noted in 1,120 cases. Of these, 417 were cases of M greater than 6 D., and in 10 per cent. of the latter, signs of choroidal atrophy were entirely absent, and in as many more they were insignificant. Total absence was noted once with $M=14D.$, 4 times with $M=\frac{1}{3}$, 14 times with $M=\frac{1}{4}$, 14 times with $M=\frac{1}{5}$, 8 times with $M=\frac{1}{6}$. Among these cases were persons of from 50 to 60 years of age.

Increase of Myopia in the Absence of Convergence and Accommodation.—In several instances in which one eye had been removed, the fellow eye, emmetropic at the time of the excision, was found years afterwards to have become myopic. Thus a girl, aged 8 at the time of excision, and emmetropic, had 9 years later, in spite of pronounced hypermetropic contour of the eye, $M=\frac{1}{30}$, and $V=1$. (It is not stated that the reality of the M was tested by atropine.) A male, aged 8 at the time of excision, and emmetropic, had 15 years later, $M=\frac{1}{15}$, $V=1$, and normal accommodation: the degree of M was the same with the ophthalmoscope. In another case, one eye being blind, the fellow eye acquired $M=\frac{1}{10}$ during 40 years. (These are cited as cases in which the effort of convergence is excluded, but is it certain that in single-eyed people the act of accommodation is fully dissociated from movement downward and inwards? Apart from convergence and near vision, it is likely that a single eye habitually makes larger excursions inwards than an eye with an active fellow.) The development of myopia in the absence of accommodation is established by the observation in several

instances of progressive myopia in eyes from which the lens had been removed in early youth.

JAVAL (Paris). Contributions to Ophthalmometry.

Annales d'Oculistique, May—June, 1882, p. 213, and July—August, 1882, p. 33.

By comparing the amount of corneal astigmatism indicated by the ophthalmometer (*vide* O. R., vol. i., p. 38) with the astigmatism of the whole refracting system of the eye, in a number of cases Javal has brought to light some important points concerning the seat of the error and its relation to accommodation.

He finds that the total astigmatism—*i.e.*, the astigmatism present in the unaccommodated eye—is usually somewhat greater than the corneal astigmatism. The excess must be referred to the lens, and hence the astigmatic eye may be regarded as deformed in the same sense throughout. But this lental astigmatism, which may be called *static*, is discoverable in young persons, or those with active accommodation, only after the full use of atropine ; under ordinary circumstances it is neutralised by an accommodative effort, and often more than neutralised, for a lental astigmatism in the opposite direction may be effected, by which a part of the corneal astigmatism is neutralised. Thus a static lental astigmatism symmetrical with that of the cornea, is transformed into an accommodative lental astigmatism which is opposed to it. This will explain the fact observed by Nordenson in conjunction with the author, that in young people a corneal astigmatism of 1 D may coexist with a better than normal acuity ($V=1\frac{1}{2}$ Sn.) ; it also is one cause of the decrease of acuity with age. Javal supposes that Donders, when he found the corneal astigmatism to be usually *greater* than the total astigmatism, made his observations upon young eyes, in which the accommodative lental astigmatism was not entirely suppressed by atropine.

A series of illustrative cases is given.

The corneal constitutes in almost every case the greater part of the total astigmatism, and in practice the difference may usually be neglected ; that is to say, the glasses indicated by the measurement of the cornea may be ordered without subjecting the eye to the use of atropine.

The Diagnosis of Locomotor Ataxy by Ocular Symptoms. *Recueil d'Ophtalmologie, September, 1882.*

The ocular symptoms of locomotor ataxy may be divided into two groups:—1, those which depend on changes in the optic nerve; 2, those which depend on lesions of other ocular nerves. Symptoms more or less resembling those which occur with locomotor ataxy (posterior sclerosis) are met with also in insulated sclerosis, and it is important to distinguish as far as possible between the two.

The symptoms arising from changes in the optic nerve are found in connection with the acuity of vision, the visual field, the perception of colours, and the objective condition of the optic nerve.

With regard to *visual acuity* it may be noted that in insular sclerosis the horizontal position of the body produces some improvement, while in ataxy no such change is observable; also that, late in the course of the malady, while in insular sclerosis the patient retains some perception of light, in ataxy blindness becomes absolute. In neither condition is there any definite relation between the deterioration of vision and the degree of visible change in the optic disc, for one may find a nearly normal acuity with an advanced atrophy of the disc, and *vice versa*.

The *field of vision* is diminished, and as far as the eyes are concerned this is often the first change noticed by the patient. Just contrary to what occurs in glaucoma, the retraction takes place first at the outer limit of the field; it has frequently a sector-like shape, thus contrasting with simple atrophy and with pigmentary retinitis, in which the contraction is concentric. The sector is at first an isosceles triangle, the base of which lies at the periphery, the apex in the projection of the yellow spot (or rather, as Förster states, at the blind spot, *i.e.* the optic disc, for the region of the yellow spot remains long intact or nearly so). As the malady advances the sector widens like a fan, and ultimately invades the whole field. The yellow spot is the last point to suffer, and so it sometimes happens that a patient is still able to read when the extreme contraction of the field renders him unable to guide himself in walking. The diminution of the visual field is symmetrical in the two eyes,

though often of unequal extent, being more advanced in the one than in the other. It occurs in like manner in cases of insular sclerosis, and is therefore not a distinguishing symptom between these maladies; but if the retained portion of the field be found to have normal acuity of vision the presumption is in favour of locomotor ataxy. During the extension of the sector-like defects there may come a time when the outer half of each field is blind. Such a condition might be confounded with temporal hemianopia, and it would be impossible to distinguish the one from the other merely by mapping the field, for in both the line of demarcation lies to the outer side of the fixation point, and in both the transition from the seeing to the blind area is gradual rather than abrupt. The diagnosis would rest upon the other signs of locomotor ataxy, and upon the progressive diminution of the field without discoverable cause, accompanied by atrophy of the disc.

The visible *changes in the optic disc* are those of gray atrophy. The disc retains its form and dimensions, but loses its colour. The nerve fibres are replaced by a tissue which reflects light strongly, presenting under strong illumination by the indirect method a glistening white, like mother of pearl; under feeble illumination, by the direct method, a bluish or greenish gray colour. The margin of the disc is sharp, the smaller vessels disappear, the larger ones remain; on account of the opacity of the disc they are not traceable into its substance, but seem merely applied to its surface. Even the larger vessels may ultimately disappear but not until vision has been long abolished. As in all other kinds of atrophy, the *perception of colour*, especially of red and green, is lost as the atrophy advances. According to Robin it is not lost in cases of insular sclerosis even when visual acuity is considerably impaired.

The symptoms due to lesions of the other nerves of the eye are paralyses of the muscles and consequent diplopia, mydriasis and loss of accommodation, and myosis. The muscular troubles are generally preceded by the visual; they appear suddenly, are of short duration, and disappear in the same way. In some cases there is a spasmodic contraction, in others a paresis; most commonly there is a paralysis, which is distinguishable from paralysis of syphilitic origin by the absence

of a specific history, and by its spontaneous disappearance. The muscles most frequently affected are the elevator of the upper lid and the internal rectus. The external rectus suffers more rarely, the superior oblique more rarely still. The paralysis is rarely complete, and it is usually limited to the one eye.

Inequality of the pupils, through mydriasis or myosis, is not pathognomonic of ataxy, but the myosis which occurs in this disease has a peculiar character which in many cases aids the diagnosis. The pupil remains motionless under the influence of strong light, and does not dilate in darkness; but it dilates when accommodation is relaxed, and contracts when it is in action ("Argyll-Robertson pupil"). It dilates during attacks of lightening pains. The myosis persists after blindness is complete. In general paralysis the immobility of the pupil is complete both under the influence of light and during efforts of accommodation. In sclerosis the pupil is active both in response to light and during accommodative efforts.

In spite of the foregoing it is not possible to predict locomotor ataxy with certainty in a patient who presents only the ocular symptoms. In most cases the diagnosis between this disease and insular sclerosis must remain doubtful until the development of other symptoms decides it.

W. KROLL (Crefeld.) The Influence of Education on the Colour-sense. *Centralblatt. f. prakt. Augenheilkunde*, December, 1882, p. 353.

The author points out that in no other town in the world, excepting perhaps Lyons, could the influence of education upon the colour-sense be studied so advantageously as in Crefeld. The town has 80,000 inhabitants, and the silk trade, especially that in coloured stuffs, has flourished there for two hundred years. One thousand six hundred dyers, and about 6,000 weavers live in the town. In the town and surrounding district there are from 35,000 to 40,000 velvet and silk weavers. (In the whole German Empire there are 80,000). Further, it must be noted that not only the weaver himself but his whole family are concerned in the industry, even children too young to go to school being

accustomed to sort silks for the loom, a process depending upon the distinction of colours. Thus a large proportion of the inhabitants are accustomed from their earliest youth to the observation of colour.

In general, the frequency of colour-blindness may be stated at about 3 per cent. amongst men, and '3 per cent. amongst women. Many observers have found the percentage amongst men higher than this, but none have found it lower. In Crefeld a very different proportion was discovered by the author.

The examinations were very carefully made by the methods of Holmgren and Stilling. One thousand and twenty-eight males, nearly all of whom were connected with the trade, were examined. Six cases of colour-blindness were discovered, and in eight other cases the colour-sense was somewhat weak. Two of these colour-blind persons were unconnected with the trade, and, moreover, were not discovered by the author, but were sent to him for examination as being notoriously colour-blind ; a third, who was connected with it, was sent to him in like manner, and for the same reason. Including these three latter, the proportion was '6 per cent. ; but, seeing that cases thus selected do not properly belong to the statistics, the proportion may be stated at '3 per cent., the same as has been established in general for women. In all the six cases the defect was for red and green ; no case of blindness for blue and yellow, or of total colour-blindness was met with.

No difference was discoverable, as a rule, in the acuity of colour-perception of the men and women, respectively, engaged in the trade. The colour-dyers possessed by far the highest sensitiveness in this respect, the power possessed by these men being much greater than that of women in general. The rapidity with which they selected and named the seven colours of the spectrum, and with which they went through the whole examination, was astonishing. Black-dyers showed less acuteness, and occupied twice the time in examination ; it was easy to select from amongst them those who had previously been colour-dyers. Master-hands among the black dyers had, however, a marvellous facility in distinguishing from each other a number of blacks, each containing a minute quantity of

another colour. Where the author, although possessed of acute perception, could hardly distinguish three shades, these men sorted twenty.

To these statistics it might be objected that in this industry, only workmen with good colour-perception would be employed ; but the owner of a large establishment, where the hands were often changing, stated that in twenty-five years he had met with no case of colour-blindness. Rejections for colour-blindness would not be necessary, because the work of the dyers, and indeed of the weavers where machinery is used, is purely mechanical. The sharpening of the colour-sense would seem, therefore, to arise simply from having a variety of colours constantly before the eyes.

On the strength of the foregoing, and in view of the undoubted value of an acute colour-perception, the author urges, as Magnus and others have done, that the cultivation of the colour-sense by coloured alphabets or otherwise should be generally attended to in schools. By this means the comparative indifference to colour, and the high percentage of absolute colour-blindness now prevailing among men, would probably be replaced in the course of generations by a colour-perception as keen as that which now belongs peculiarly to women.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, JANUARY 11TH, 1883.

WILLIAM BOWMAN, F.R.S., President, in the Chair.

REPORTED BY DAWSON WILLIAMS, M. D.

The Growth of the Crystalline Lens.—Mr. Priestley Smith began by quoting a passage from the chapter by Otto Becker in the Handbook of Graefe and Saemisch, to indicate the present position of knowledge on this subject, and then proceeded to describe an original research carried out during the

last two years. He had examined 142 lenses, removed in their capsules, shortly after death, from the eyes of 83 adult subjects. Special precautions were taken to avoid changes from absorption or evaporation of moisture. Each lens was accurately weighed ; its volume was then measured by means of a specially devised instrument acting by displacement of fluid along a graduated tube ; finally, it was measured as to its transverse diameter. The author's aim had been to examine at least 20 transparent lenses in each decade of adult life ; this had been accomplished up to the age of 70, but between 70 and 90 the numbers were not yet fully made up. Detailed tables were appended to the paper, and the general results were demonstrated to the meeting by charts and diagrams. It was shown that the average weight of the lens continually increases throughout the whole period of life, unless pathological processes intervene, the increase being, roughly speaking, at the rate of 1·5 milligrammes each year ; and that the volume of the lens also continually increases, and in about the same proportion, the increase being at about the rate of 1·5 cubic millimetre each year. By calculation from the weights and volumes, it was found that the specific gravity remains, on the average, about the same throughout life, though there are lenses of low and lenses of high specific gravity in each decade. Reservation, the author pointed out, is necessary in accepting linear measurements of the lens after its removal from the eye ; but, from the data obtained, it was demonstrable mathematically that the enlargement of the lens is not by any means limited to the transverse diameter.

The continuous enlargement of the lens, though hitherto unobserved, and though apparently separating this organ from every other in the body, was readily intelligible from a physiological point of view ; for the lens is, by development, a cuticular structure, the cells of which, unlike those of the cuticle, multiply within a closed capsule, and cannot be thrown off as they grow old, the older cells being surrounded by the younger. It will, the author believed, probably explain certain of the physiological changes which occur in the senile eye. Thus the flattening of the surfaces, which would accompany even a symmetrical enlargement, may perhaps account for the common acquirement of hypermetropia in old age. Again, the shallowness of the anterior chamber of the healthy senile eye, hitherto

attributed to an advance of the whole lens—for which there is no explanation, and which is not in accordance with the actual change of refraction—is undoubtedly the expression of the increased thickness of the lens.

In the tabulated results the relation of senility to the development of cataract came out clearly. Lenses which showed any opacity were distinguished from the others upon the chart, and were seen to be, on the average, smaller than transparent lenses of the same age. As this difference was present even when the opacities were very slight, it seemed likely that a period of diminished rate of growth preceded the formation of the opacities of senile cataract. The opacities were in most cases limited to the equatorial zone, where the capsule and cortical layers of the lens were subjected to the traction of the suspensory ligament. This supported the conclusions recently published by Becker concerning the formation of opacity by separation of the fibre-layers at the equator. The bearing of the continuous enlargement of the lens upon certain other morbid conditions was reserved for future consideration. The instrument used in the investigation was shown to the Society.

The President congratulated the Society upon having received the paper. It would, he thought, become a standard work of reference with regard to a number of physiological and pathological points. He suggested that it would be well to ascertain what changes in the capsule accompany the enlargement of the lens. The capsule must be stretched by the increased volume of the lens, and this increase in its tension may react upon the form of the lens.

Mr. Higgins asked whether the author could, from his researches, explain why presbyopia sometimes decreases in very old people, and why myopia sometimes occurs with incipient cataract.

Mr. Priestley Smith expressed his gratification at the way in which his work had been spoken of by the President. He could not give an answer to Mr. Higgins's questions. It was difficult to estimate the combined result of several changes, some of which were antagonistic—*e.g.*, the enlargement of the lens, the change in its consistence, the possible increase of

tension in the capsule, and the diminishing effect of the ciliary muscle.

A Case of Paralysis of the Third Nerve, with Cerebral Symptoms.—Dr. David Lees showed a girl, aged $6\frac{1}{2}$, who had been brought to the Hospital for Sick Children on November 10th, 1881, on account of a squint of the right eye, and shaking of the left arm and leg. The squint had been noticed three months earlier, and the shaking a fortnight after the squint. She had had three fits when a year and a half old, none since ; slight headache over the right eye for the fortnight before she was brought to the hospital. There was complete paralysis of the right third nerve ; the pupil was dilated, and did not respond to light or in accommodation ; the upper lid drooped slightly ; no affection of the fifth or seventh nerves could be discovered ; both optic discs were normal. The movements of the left upper limb consisted in slight forward and backward movements of the whole limb in a vertical plane, together with short flexions and extensions of the wrist ; they were rhythmical and uniform, and occurred when the limb was not used ; and the mother stated that they did not quite cease during sleep, and were worse when the child was excited ; there was no distinct paralysis of the limb ; similar, but less decided, movements affected the lower limb. No history of congenital syphilis could be obtained, but there were suspicious circumstances. After treatment for twelve months with iodide of potassium, the shaking and the squint had disappeared, leaving only a little weakness of the internal rectus. The right pupil, however, remained dilated and motionless, and accommodation was wanting. The condition still remained unaltered. The case, Dr. Lees thought, presented the group of symptoms to which Mr. Hutchinson had given the name of ophthalmoplegia interna, and which he attributed to disease of the lenticular ganglion ; but in this case the symptoms seemed to be due to a cerebral lesion, probably near the nucleus of the third nerve, below the aqueduct of Sylvius.

Dr. Hughlings Jackson said that an affection of the third nerve, combined with a disorder of movement limited to the opposite side, pointed to a lesion of the crus cerebri, but that he had never met with a case of rhythmical movements, such as were present in this case, from organic disease ; most cases of

rhythmical movements occurred in patients who were either malingerers or hysterical, but this patient evidently belonged to neither class.

Dr. Stephen Mackenzie said that if the ocular defect and the motor disturbance were not coincident in their onset they might be attributed to two distinct lesions.

Mr. Jonathan Hutchinson would not apply the term ophthalmoplegia interna to such a case as this; the symptoms might all be traced to paralysis of the third nerve without any implication of the sympathetic, for there was no paralysis of the dilator of the pupil; whereas in ophthalmoplegia interna the pupil was motionless, and of medium size, sphincter and dilator being both paralysed. He thought the child's physiognomy very suggestive of inherited syphilis.

Dr. Buzzard observed that, though the motor disturbance was not noticed until a fortnight after the ocular defect, yet there might have been some loss of power in the affected side at an earlier period, so that the irregular movements might be such as are sometimes seen after hemiplegia. On the other hand, no tendon reflex was obtainable on the left side; whereas in a case of coarse lesion, such as a gumma, an exaggerated reflex would at so late a stage probably be present. He was inclined to believe that the lesion was one of the nerve rather than of the centre.

Mr. Brudenell Carter thought that the non-recovery of the pupil might be due to atrophy of the muscle through long continued abolition of nerve influence; just as galvanism is used to maintain the contractility of other muscles until the normal stimulus is restored to them, so should eserine be used in the case of paralysis of the sphincter of the iris.

Dr. Lees accepted the suggestion as to eserine as a valuable one. There could hardly have been two lesions in this case, since the effects were synchronous in onset and in recovery. Probably the lesion lay near to the nucleus of the third nerve, and by the pressure it set up caused the tremors in the arm.

Paralysis of the Sixth Nerve, with Choreiform Movements of the Face.—Dr. Lees also exhibited a boy, aged 11½ years, who had had convergent strabismus from the age of three years.

The left eye could not be brought to the outer side of the median position ; there was no other interference with ocular movements ; pupillary action normal ; the optic discs presented crescents. Spasmodic contractions of the facial muscles, chiefly on the right side, occurred at irregular intervals. These choreiform movements, as well as headache, which he had suffered from for some months, were probably due to the hypermetropia and astigmatism with which both eyes were affected. There was no paralysis of the seventh nerve.

Movements of the Eyes provoked by Pressure on a Diseased Ear.—Dr. Hughlings Jackson described a case which resembled one reported by Schwalbach, and was important as a demonstration that ear-disease is one cause of, or one factor in, producing vertigo. It was a clinical illustration of one of Cyon's experiments on the semicircular canals of rabbits. The patient, a woman aged 49, had suffered from otorrhœa on the right side from childhood. She had recently become subject to attacks of auditory vertigo, and had a peculiar unsteady gait, resembling that produced by alcoholic intoxication. Pressing on the tragus of the right ear caused certain definite movements of both eyes ; first, the eyes moved slowly to the left ; then they moved back again, by jerks, to the right ; at the same time she felt giddy, and there was apparent displacement of objects to the left. This displacement was synchronous with the slow movement to the left. The patient was examined by Mr. Laidlaw Purves and by Mr. Couper ; and, under treatment, by syringing the ear, and the internal administration of quinine, she improved so that only the very slightest movements of the eyes were producible by the pressure spoken of. Dr. Jackson referred to researches by Dr. James, of Boston, U.S.A., which seemed to show that deaf mutes were not easily made giddy by rotatory movements, and were not at all liable to sea-sickness. He thought that the procedure mentioned in this case, might probably be helpful in the diagnosis of some difficult cases ; and that the different results obtained at different periods in such cases would be some measure of the patient's progress. So far as it was possible to do so Dr. Jackson had satisfied himself that the apparent movement of objects was synchronous with the *slow* movements of the eyes, and was in the *same* direction as these latter. (On this subject *vide* O. R., vol. i., p. 16.)

A New Method of Determining the Relation between Convergence and Accommodation.—Dr. Maddox sent for exhibition an instrument designed to test the relation between convergence and accommodation by a new method, a description of which was read by Mr. Nettleship. The instrument consists of a small wooden box forming a dark chamber, into which both eyes are directed ; a small aperture in the far side of the box affords a binocular fixation point. A small shutter is moved so as to intervene between the fixation point and one eye. This eye being then in darkness assumes its position of equilibrium. The novelty and ingenuity of the instrument lies in the mode by which the position of the occluded eye is ascertained. In the far side of the box is a sliding strip of brass (one for each eye), in which is a minute aperture giving a point of light ; this is moved until the point of light falls upon the optic disc and thus becomes invisible ; the direction of the optic axis can be read off from degrees marked upon the slide.

Peculiar Growth developing from an Eyelash in the Anterior Chamber.—Mr. Rockliffe's case, read by the Secretary.—The patient, a man aged 23, received a vertical lacerated wound in the outer third of the cornea, and the lower lid. Six weeks after the accident an eyelash could be seen in the anterior chamber, reaching from the angle of the chamber to the middle of the pupil ; there was a slight pink zone around the cornea, and cataract. An attempt to remove the eyelash failed. A year later the eye became acutely inflamed, and, at the inner end of the cilium, was a peculiar white woolly growth which rapidly increased. Mr. Rockliffe opened the anterior chamber, and the tumour with cilium firmly adherent to it, was carried out with the gush of aqueous. Dr. Brailey examined the mass, and reported that it consisted of flattened epithelium-cells like the superficial cells of the conjunctiva ; it seemed possible that the cells of the root-sheath had proliferated within the anterior chamber.

Mr. Henry Power said that he had seen a similar case. The patient, a boy, accidentally thrust a knife into the eyeball ; an eyelash was carried on to the iris, became implanted, and continued to grow in that situation ; it was removed without difficulty.

Mr. Couper said that in a similar case under his care at Moorfields, Mr. Nettleship had examined the material that came away with the lash when it was removed, and had found that it consisted of cholesterine. It seemed probable that some of the sebaceous cells of the sheath of the hair had been carried with it into the anterior chamber and had gone on growing there. The hair had become coiled up in the angle of the chamber. The patient did well after the operation for the removal of the mass, and recovered with good vision.

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MODES OF PRESERVING AND DRAWING OPHTHALMIC SPECIMENS.

BY PRIESTLEY SMITH.

Several inquiries have reached me lately concerning the method which I employ for the preservation of ophthalmic specimens. A description of the process has been given from time to time to a good many friends, but as it has not been printed in an accessible form it may perhaps be useful to repeat it here.* I also propose to add a note upon a simple arrangement which I have found very convenient for the purpose of making accurate drawings of bisected eyes or other objects which are too large to be mounted on slides and placed on the stage of the microscope in the ordinary way.

Mode of Preparing and Mounting.—The following are the stages of the process:—

1. The eye is placed, immediately after excision, unopened, in Müller's fluid for about three weeks, light being carefully excluded. It is well to change the fluid every two or three days, otherwise the specimen may be permanently stained; this happens all the more readily if light be not excluded. The fluid consists of

Bichromate of Potash	...	1 part.
Sulphate of Soda	...	1 "
Water	...	100 "

2. It is then wrapped in a piece of thin gutta-percha membrane, the surface of which has been greased to prevent adhesion, and *frozen solid* by immersion in a vessel containing a mixture of ice and salt. The vessel should have a hole at the bottom, so that water may drain away; a flower-pot answers well. To freeze the

* The first published suggestions for preserving specimens of the eye in glycerine jelly were given by Edward Nettleship in 1871 (R. L. O. H. Reports, vol. viii., p. 225).

eyeball solid takes not less than half-an-hour ; a valuable specimen may be spoiled by disturbance of the internal parts if cut open before it is solid throughout.

3. When frozen it is divided in the required direction by means of a sharp table knife. A thicker blade, such as a razor, goes through the frozen globe with difficulty. If the exact position of the section is of consequence the points through which it should pass should be marked with a spot of ink before freezing.

4. The bisected specimen is placed in a 5 per cent. solution of chloral-hydrate in order to remove the colour of the Müller's fluid, the solution being changed every two or three days until it is no longer discoloured.

5. It is then placed successively in glycerine solutions, 10 per cent., 25 per cent., and 50 per cent., remaining in each for twenty-four hours or more. This process is necessary in order to prevent shrinking of the tissues when the specimen is placed in the jelly.

6. It is then mounted. A specimen-jar being filled with melted jelly, the half-eye is placed in it, the concavity upwards. When every interstice is filled it is turned over, care being taken to avoid the imprisonment of an air-bubble, and held, by means of a needle, in contact with the bottom of the jar. When the jelly is coagulated the jar is closed by glueing a disc of white cardboard upon its open end. The cardboard forms a white background to the specimen ; it is not in contact with the jelly.

The jelly is made according to the following formula :—

French Gelatine	...	...	1 part.
Glycerine	...	...	6 parts.
Water	...	...	6 „

Soak the gelatine in the water until it is swollen ; heat it, and add the glycerine ; add a trace of carbolic acid ; filter, while hot, through white blotting paper.

The strongest and most colourless gelatine is that made by Coignet & Co., of Paris, obtainable in packets, and known as the "gold label" variety. The specimen jars are manufactured expressly by Messrs. F. & C. Osler, of Broad Street, Birmingham.

Instead of immersing the globe in ice and salt, it may be frozen by ether-spray. The eyeball, suspended by a thread, may be hung inside a jar of some kind, and be sprayed upon through a hole in the side of the jar; it rotates rapidly and thus gets frozen equally on all sides, and some of the ether is caught in the jar and saved. This is a clean and rapid mode of freezing; but a complete solidification of the globe can only be obtained at the expense of much ether.

It is sometimes desirable to remove a thin slice from the cut surface of one of the hemispheres for the purpose of making thin microscopic sections, and yet to preserve both hemispheres for mounting. This may of course be done by freezing the whole hemisphere, the cut surface upwards, in gum, in the well of the ordinary ice microtome. A readier way is to place it, the cut surface downwards, on the plate of the ether-freezing-microtome (Bevan Lewis) with a few drops of gum, freeze it to the plate, and then with a cataract knife cut it away again, leaving a thin layer frozen to the plate, from which sections can at once be taken.

Dr. P. H. Mules, who has preserved a large number of specimens by the foregoing method, kindly sends, at my request, the following memoranda of his experience :—

"For museum purposes, where the object is required to be mounted with the greatest nicety, I adopt the following precautions :—

"(1.) Immediately after excision of the eyeball the sub-conjunctival tissue and remnants of muscle are carefully cleaned off with curved scissors; the globe is then very lightly

rolled over in a thin soap-lather until all blood is removed ; it is rinsed in clean water and immersed in Müller. This washing prevents afterstaining and decomposition of the Müller's fluid.

"(2.) If two or three specimens are to be mounted at the same time I keep them from rising in the warm jelly by crossing the jar with a strip of card, sufficiently heavy, with a pin thrust through it head downwards, which can be raised or lowered as required.

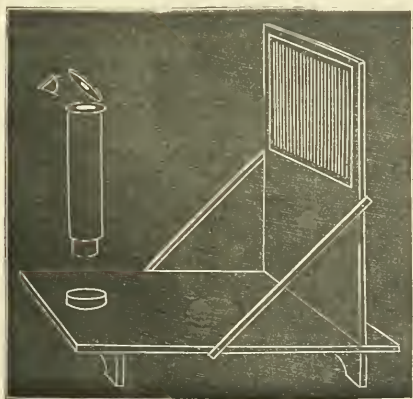
"(3.) The preparation of the jelly is a most important item, and I find it best to prepare a *thin, clear* jelly, and evaporate it on a water-bath to the required consistence.

"(4.) The specimens should be examined every few months, when, if the jelly is seen to have shrunk from the sides of the jar, a hot iron is held over it to cause the jelly to run and fill up the interstices. To facilitate this I have long given up fixing the jars with any covers, and find they do best on a white glass sheet mouth downwards. Should the glycerine separate from the jelly, which it occasionally will do, the jelly should be remelted at once. If carefully mounted, the most evanescent appearances are fixed and retained. I have specimens of blood-clot which have been mounted for two years and look quite fresh.—P. H. MULES."

Mode of Drawing.—Drawings of the divided globe—*i.e.*, drawings which are intended to represent the size, shape, and relative positions of the various structures, rather than their minute histological appearances—should, as a rule, be made before the specimen is mounted, for a much stronger illumination and better definition can be obtained while the specimen lies in fluid in an open jar than when it is embedded in jelly and covered with glass. The accompanying figure shows an arrangement by which such drawings may very readily be made.

The apparatus consists simply of a wooden stand, high enough, when placed on the table, to bring the reflector of the microscope about level with the eye ; and, hinged to one end of this, a flap which can be secured firmly in the vertical position. On the vertical flap is pasted a sheet of paper, divided by lines into

centimetres and millimetres, so as to afford the means of measuring any image which is seen projected on it. The paper which is to receive the drawing is laid over this, and held by means of clips at the edge. The feet of the microscope fit into corresponding notches in the stand, so that the distance between the vertical axis of the instrument and the plane of the drawing is the same in all cases. A scale of enlargements corresponding to the different powers of the microscope, and to the various adjustments of the draw-tube, having been once prepared experimentally, any desired degree of enlargement can be given to the drawing by adjusting accordingly.



The reflector which I employ—a form which has no doubt been used by others, though I have not seen any statement to that effect—is simply a disc of ordinary looking-glass, from the centre of which the silver is removed, held in a suitable support. It is placed at an angle of 45° over the ocular of the microscope. The eye, looking

horizontally, sees, through the central aperture, the paper on which the drawing is to be made ; it also sees, reflected from the area around the aperture, the object which is under the microscope. By adjusting the light so that neither image overpowers the other, the picture of the object is seen projected on the paper, and can be readily traced with a pencil. This mirror is, to me, easier than either a prism or a neutral-tint reflector. Drawing upon a vertical sheet of paper is perhaps a little more difficult to the unpractised hand than drawing upon a horizontal one, as in the ordinary way ; but the immunity which the draughtsman obtains from fatigue of the neck and from congestion of head and eyes, gives this position a great advantage over the other, and will, I think, never be abandoned in any kind of microscopic drawing by one who has once tried it.

The specimen lies in chloral solution in a glass jar. In order to secure its immobility a small support cut from a bit of thin metal is placed inside the jar, in which the half-eye lies after the fashion of a wash-hand basin in its stand. The jar is placed below the stage of the microscope, the mirror being removed, for with the low powers usually employed ($1\frac{1}{2}$ inch or 2 inches objective) it is inconvenient to raise the barrel of the instrument high enough to allow the specimen to be placed upon the stage.

Daylight is usually easier and pleasanter to draw by than artificial light, but it is by no means essential ; if it were so, especially during the winter months, most of my own specimens would have remained undrawn. An extremely good illumination of the cut surface is obtained by placing a lamp or candle at about twelve inches from the specimen, and at a slighter higher level, and focussing the light upon it by a condenser.

Although every possible precaution be taken, it is hardly possible in some cases to obtain a drawing which exactly represents the relative positions of the structures in the living eye, and in the class of cases to which my

own work has been chiefly directed—cases of glaucoma—the inaccuracies are, I think, of especial importance as affecting the conclusions to be drawn. Thus, I believe that the general contour of the eye, especially if it be far from spherical, alters somewhat as the intraocular pressure, whether normal or excessive, subsides after excision; and it certainly sometimes alters as the result of the bisection. Regarding the eyeball as a sphere constricted at the circle formed by the junction of sclera and cornea, it seems to me that its division into halves relieves this constriction in such fashion that the constricted part flattens out somewhat at each side, so that its transverse diameter, measured in the plane of the section, becomes greater. The change, though difficult to ascertain by measurement, is obvious enough if the relations of the parts are watched while the frozen hemisphere thaws in chloral solution beneath the microscope. I have attempted to prevent it by filing out a hole in a bit of thin metal to the exact size and shape of the globe before it is divided, and fitting the hemisphere into it immediately after division—a most tedious procedure, seeing that hardly any two globes are quite alike in shape, but one which certainly sometimes adds to the accuracy of the results. Again, the position of the lens and iris, especially if they have been driven forward by an excess of pressure in the vitreous chamber, may sometimes be seen to alter considerably during the first hour or two following the division of the globe. A glass marble or a small prop of metal introduced into the vitreous chamber so as to bear against the posterior surface of the lens may sometimes be used to retain the parts or to replace them in the position which they were seen to occupy while the tissues were still frozen. The plan is of course open to the objection that the observer may unintentionally arrange the structures in accordance with preconceived ideas rather than with fact. In any case the inaccuracies which may arise from such changes of form and position must be borne in mind.

Drawings of which woodcuts are to be made are copied with the greatest truth when they are photographed upon the block. This process is more expeditious, more exact, and usually less expensive than copying on the block by hand ; it also has this advantage, that the original drawing can be made of any size, and can be reduced to any extent upon the block without loss of accuracy.*

THE PREPARATION OF THE TISSUES OF THE EYE FOR MICROSCOPICAL EXAMINATION.

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The histological methods suitable for the examination of the eye are very many, and a mere attempt to enumerate all of them would be more than sufficient to fill a lengthy paper ; whilst for most workers with the microscope such a list would be almost useless ; unless indeed they had time and inclination to try all, and select the more valuable. The writer has therefore confined himself to a short description of those methods which, from practical experience, he believes to be at once the simplest and best. The recipes given are drawn from very various sources, and though, unfortunately, it has not been found possible in most cases to acknowledge the authority, no pretension is made to originality in any of them. The description naturally falls into four divisions—methods of *hardening, cutting, staining, and mounting* the tissues.

* It is hoped that any one who may be able to suggest improvements in the methods described in this paper, or who is in possession of better ones, will describe them for the benefit of the readers of the O. R.

I. HARDENING THE TISSUES. The most useful hardening fluids are Müller's fluid and methylated spirit. Müller's fluid has a somewhat slow tanning action on the tissues, and has the great merit of not causing any shrinkage or alteration in the relative position of the parts. Methylated spirit hardens rapidly ; but, from its affinity for water, abstracts fluid from the tissues, and hence is apt to cause the less dense structures to shrivel more or less. On the other hand, methylated spirit preparations take on staining re-agents remarkably well.

A very good plan is to place the tissue in Müller's fluid for one week (changing the fluid at the end of twenty-four hours), and then transferring to a mixture of equal parts of Müller and methylated spirit for a fortnight. If only minute pieces of tissue are employed, a somewhat shorter time will suffice.

II. CUTTING THE TISSUES. Section-cutting by hand has now been almost entirely superseded by the use of the freezing microtome. By the latter method it is not only possible to cut large and perfect sections of any required degree of thinness with a but trifling amount of practice, but also it becomes unnecessary and, indeed, unadvisable to harden the tissues to the extent formerly practised.

To prepare the tissues for freezing they should be allowed to soak for twenty-four hours in a basin of water, and then submerged for another twenty-four hours in the following fluid :—

Mucilage of Acacia	...	BP	{ 3 parts.
Simple Syrup	...	BP		{ 1 „

Mix and add to each ounce four drops of pure carbolic acid. Should the tissue be particularly delicate, it may prove advisable to pass it through a solution of half strength first, to prevent shrinkage ; it will, however, be usually found that when placed in water the sections quickly regain any fluid which they may have lost through placing in the gum and syrup solution. To

freeze the tissue it must be placed on the plate of the microtome, surrounded by sufficient gum mucilage (BP) to make it adhere when frozen, and to protect the edges of the piece. Sections when cut should be floated on to a basin of water, when the gum dissolves out ; and if it be not convenient to examine them within twenty-four hours they may be kept for any length of time in a mixture of equal parts of glycerine and spirit.

Freezing microtomes are worked either by means of a mixture of ice and salt, or by ether spray. Of the former, Swift's microtome is perhaps the best ; for laboratory and class purposes it is excellent, as a large number of sections can be cut with great rapidity and accuracy ; but for private work the instrument is somewhat bulky, and takes some time to bring down to a freezing temperature. Moreover ice is not in all places readily procurable. Ether freezing machines freeze very rapidly, and are always ready for use at a minute's notice. Several machines are sold, but there is no microtome which, in the writer's estimation, is equal to a new model recently devised by Mr. C. W. Cathcart, Lecturer on Anatomy at the Edinburgh School of Medicine, and which will be described and figured by him in the forthcoming number of the *Journal of Anatomy*. By an ingenious arrangement, complete vaporisation of the ether is secured, and consequently the freezing is effected rapidly and with a minimum expenditure of ether. The knife works on glass bearings, which secure perfect smoothness of action, and do not blunt the knife-edge, and is controlled by the right hand ; thus leaving the left hand free to manipulate the screw. Another merit must not be forgotten, viz., that it can be made for less than half the cost of any freezing microtome at present in the market.

III. STAINING SECTIONS. The best, by far the best, staining re-agent is Ranvier's Picro-Carmine fluid, for it has in a higher degree than any other the property of

differential and selective staining. If it be not as extensively used as its merits deserve, it is probably because the processes of staining have not been carried out in strict accordance with the author's instructions, and hence have not given satisfactory results. Picro-Carmine Fluid is prepared as follows :—Take one gramme of Carmine, dissolve it in a test-tube with three or four cc. of Strong Liquor Ammonia and a little water by the aid of heat, and pour this slowly, and with stirring, into 100 cc. of a cold saturated solution of Picric Acid. Allow the fluid to evaporate in a basin exposed to the sunlight to about one half; and then dilute with water up to about 80 or 90 cc., add 1 cc. of Carbolic Acid, and filter.

To stain a section, spread it on a slide and cover it with two or three drops of the fluid, which should be allowed to remain on for about a minute; then run the fluid off, and remove most, but not quite all, of the superfluous moisture with a fine cloth or a piece of blotting-paper; and preserve by adding a drop of Farrant's solution (see below), and a cover-glass. The section will be stained a somewhat orange-red colour, but in a few days the microscopic appearances become greatly altered by the selective action of the tissues. Thus in case of inflammation of the cornea, the epithelium will be of a light yellow tint, nuclei of the growing epithelium and of any infiltrating leucocytes will through their affinity for carmine assume a full rich crimson colour, whilst the fibrous structures of the cornea will take on a rose tint. The exact time required for staining with Picro-Carmine varies with different specimens, but it is easily learnt with a little practice. Three things are to be remembered; never mount Picro-Carmine specimens in Balsam or Dammar, never wash the sections before mounting, and never dilute the staining fluid.

Logwood is a good staining agent, and it is often very instructive to contrast specimens stained by it, with ones

stained by the above method. Excellent Logwood Staining Fluid may be obtained of Mr. Martindale, New Cavendish Street, London; but for those who wish to prepare it themselves the following recipe of Mr. Cooke's will be found useful:—

Extract Haematox	...	...	6 parts.
Alum	...	...	6 „
Sulphate of Copper	...	...	1 „

Grind thoroughly and add 100 parts of distilled water; leave for forty-eight hours and then filter.

To use the stain, filter a few drops (about ten) into a watch-glass containing distilled water; place the sections therein, and when sufficiently stained, wash, and mount in Canada Balsam.

Aniline dyes have of late been much used. Of these the most useful are the Methyl and Gentian Violets, Methyl Blue, Picric-Aniline and Bismarck Brown. The sections are overstained in watery solutions of these dyes, washed in water or alcohol till the required depth of tint is obtained, and then mounted either in Farrant's solution or in Balsam. Aniline dyes stain nuclei specially well.

Osmic Acid in $\frac{1}{2}$ per cent. solution has the property of staining fat, and the myeline of medullated nerve-fibres black, and hence may prove useful in the study of fatty changes and nerve degenerations. The sections should be kept in the solution for about half a minute, or till a greyish tinge appears, and should then be washed in water and mounted in Farrant. Balsam must not be used, since clove oil is a powerful solvent of fats. Care must be taken not to overstain the tissues at the time, as they always get considerably darker in the course of twenty-four hours.

Gold chloride is used by Ranvier and others for demonstrating the nerve endings in the corneal epithelium. For a description of this process, which is only applicable to perfectly fresh specimens, the reader is referred to Ranvier's *Traité technique d'Histologie*.

IV. MOUNTING SECTIONS. The two most useful fluids are Farrant's gum and glycerine fluid and Canada balsam. Both have their special advantages and uses, the balsam preparations being very transparent, and hence useful for deeply-stained sections; but more may usually be learnt from a thin section mounted in Farrant, as the minuter structures are not so apt to be rendered over-transparent.

Farrant's solution is thus prepared :—

Of purest and most carefully picked gum

Arabic	...	...	...	...	4 parts
Aqueous solution of arsenious acid...	4	„			
Glycerine	...	...	...	...	2 „

Place in a bottle, carefully excluding all dust, and stir daily till the gum is dissolved. When made in large quantities it is usual to filter the solution by help of an air-pump, which removes at once the air-bubbles and any particles of dust; if, however, the solution be allowed to stand, it will have cleared itself in about two or three weeks; the bubbles rising to the surface, and any foreign particles sinking. Ordinary one ounce medicine phials are very suitable for this purpose, and when clear, the fluid may be transferred to bottles more convenient for use. Farrant's solution made as above will dry to such an extent that the cover-glass is firm in a week, and at the end of a month is so fixed that it can scarcely be removed. The solution as sold in shops usually contains too much glycerine, and as a consequence looks brighter and more transparent, but does not dry satisfactorily.

Canada Balsam Solution. The following is an excellent recipe :—Take ordinary Canada balsam and evaporate it at a gentle heat till it becomes quite hard and brittle on cooling; then to every hundred parts add forty-five parts of chloroform and fifty of turpentine. Dust must be excluded from the evaporating

balsam, by covering with a sheet of blotting-paper or otherwise. This solution is better than Dammar varnish, as the preparations preserved therein do not become granular with age.

To mount in Canada balsam take two watch glasses: in one place absolute alcohol and in the other oil of cloves. Place the stained section in the alcohol, spreading it out with needles if necessary, and leave it there for a short time to dehydrate; then transfer it by means of a bent spatula to the oil of cloves, and thence, when cleared up, on to the slide. The superfluous oil must be removed by draining, or by absorbent paper, and finally a drop of balsam is placed on the section, followed by a cover-glass.

New cover-glasses are best cleaned by dropping singly into strong nitric acid, and then washing thoroughly in water; and they are most conveniently kept for use in water. Slides and covers which are soiled with balsam can be cleaned either by caustic potash or turpentine.

H. WILBRAND (Hamburg). Hemianopsia and the Localisation of Cerebral Lesions. *Berlin*, 1881.

F. MARCHAND (Giessen). Bilateral Homonymous Hemianopsia and the Decussation in the Chiasma. *Von Graefe's Archiv.*, XXVIII., II., p. 63.

A. VOSSIUS (Königsberg). Bilateral Central Scotoma. *Von Graefe's Archiv.*, XXVIII., III., p. 201.

The abovenamed recent works on hemianopsia and the decussation of the optic nerves contain matter of much interest and importance.

Wilbrand's exhaustive monograph is more to be regarded as a carefully compiled catalogue of the literature of the subject than as an original contribution to our knowledge of the questions at issue; but its study cannot in future be omitted by

anyone who presumes to write authoritatively upon the subject. Wilbrand does not himself draw many conclusions from the vast array of observations at his disposal. He leans to the view of Mauthner that the fasciculus cruciatus covers the fasciculus lateralis in the papilla, so that atrophy of the former alone is sufficient to produce the ophthalmoscopic appearances of atrophy, and holds that the fibres from the periphery of the retina are those which run in the periphery of the nerves immediately behind the globe. This last theory, however, cannot now stand in the face of the observations of Samelsohn (*vide* O. R., vol. i., p. 310), Nettleship, and Vossius. The question as to which tract supplies the fibres that proceed to the macula, receives some elucidation from Table I., which contains 153 cases of lateral hemianopsia (eighty left-sided, and seventy-three right-sided). In thirty-three out of sixty-six cases, when this point was specially noted, the fixation point lay within the retained portion of the field, there being a zone of more or less intact retina between the fixation point and the line dividing the sound portion of the field from the defective region. This is in favour of the current theory that the macula is supplied by fibres from both tracts. Some additional support is given to this view by the fact that in fifty-one out of ninety-three cases recorded, the visual acuity was subnormal, although, as Wilbrand observes, the force of this is lessened by our knowing that in twenty-six of these fifty-one cases there were intraocular defects recognisable by ophthalmoscopic examination.

Table II. : (*a* and *b*) contains twenty-four cases of unilateral blindness, in which post-mortem examination, either microscopical or by measurement, went to prove the partial decussation of the optic nerve in the chiasma. Wilbrand adopts Kellermann's hypothesis as to the course taken by the fibres in the chiasma, and quotes thirty-two cases of temporal hemianopsia (without post-mortem examinations) in its support. In Table IV. he adds twelve cases of disease of the chiasma established by post-mortem dissection, where the symptoms were in harmony with the theory; and in Table V., five cases of bilateral temporal hemianopsia produced by tumours at the anterior angle of the chiasma. However, Kellermann's theory is not required to explain temporal hemianopsia, which can be well accounted for by any theory of partial

decussation. It is more difficult to account for the absence of hemianopsia in the fourteen cases of tumour at the posterior angle of the chiasma given in Table VI. Table VII. is a summary of sixty-four cases of disease of the chiasma, and Table VIII. gives the important symptoms found in forty-four of these cases, as well as in thirty-two cases of temporal hemianopsia—the latter without post-mortem examinations.

The next portion of the work is devoted to the histology and pathology of the central organs proper, the geniculate bodies, the thalamus, the cortex of the occipital lobe, the corpora quadrigemina, and the internal capsule. He then gives numerous tables of cases of lateral hemianopsia with the prominent symptoms, the constitutional affections, and the post-mortem appearances, and concludes with an excellently classified list of the literature of the whole subject. The work contains more than 200 large octavo pages, and even if it were possible to give any adequate account of it in a short abstract it is too valuable not to be studied in its totality.

Marchand's paper gives a description of the post-mortem appearances in three cases of homonymous hemianopsia.

CASE I. A student aged 21, a myope, was found to have optic neuritis and occasional headaches, 15 months later he returned to show himself cured, as he thought, and then an homonymous defect in the left upper quadrants of the fields of vision was detected. Heurtaloup's artificial leech failed to relieve a headache of which he complained, and he immediately got slight strabismus and violent vomiting. Somnolence and coma followed, and in four days from his return he died. At the autopsy next day a soft vascular glioma was found in the right temporal lobe, which pressed upon the lateral surface of the right optic tract. The posterior portion of the tract was in a condition of yellow softening, which was best marked at the lateral border, and implicated about half the tract.

CASE II. A married woman, aged 30, while in bed with an intermittent febrile attack, got a sudden fit of stupor, with almost complete right-sided paralysis, both eyes being turned towards the left, and deglutition and speech being both

impaired. Next day gradual return of speech and consciousness allowed right-sided hemianopsia to be discovered; but this partial recovery was soon followed by a relapse, accompanied by violent purposeless movement of the left extremities, rapid breathing, irregular pulse and coma, and death took place four days after the first attack. A clot was found in the left carotid, occluding it and the artery of the fissure of sylvius completely, and partially blocking the anterior and posterior communicating arteries. Corresponding to this there was softening of the insula, the corpus striatum, etc., and at the base the softening extended from the posterior half of the subst. perfor. ant. as far as the left tract, so that the latter was in contact with softened brain-tissue from about 10 mm. behind the chiasma as far back as the corp. genic. laterale. The uterus contained a three months' foetus, and the mitral valve was covered with vegetations. Microscopical examination disclosed a wedge-shaped hæmorrhagic infarction in the left tract, the apex of the wedge pointing inwards and backwards into the substance of the tract, and the lesion extending from the place where the carotid crossed the tract about 5 mm. behind the chiasma for about the same distance backwards.

This case is therefore an instance of bilateral hemianopsia produced by a sharply limited lesion of one tract, for the softening of insula, etc., cannot be supposed to have any connection with the ocular affection.

CASE III. A man of 72 years, affected with left hemiplegia, was found to have complete left hemianopsia. At the post-mortem there was discovered softening of the apex (die Spitze) of the right occipital lobe and the neighbouring convolutions, the thalamus, tract, and chiasma being normal, a small cysticercus was found in the left frontal lobe.

Marchand adds to these a brief *resumé* of those cases of hemianopsia when unilateral cerebral lesions capable of producing this symptom have been discovered. The number of cases is twenty-two, including his own, and excluding those either insufficiently reported or exhibiting complicating lesions. He divides them into three groups:—I. Lesion of one tract; seven cases, three of which are, he considers, of doubtful value. II. Lesion of one optic thalamus; three cases. III. Lesion

of one occipital lobe ; twelve cases. In group I. the cause was tumour five times, softening twice, and embolism once. In group II. there was one case of softening, one of tumour, and one of hæmorrhage. In group III. softening occurred six times, apoplexy twice, and tumours four times. This last group consists, too, principally of aged persons. It may be laid down as a rule that in the young hemianopsia is usually due to lesion of the tract, and in the old to an affection of the cortex ; and in the former case its onset is commonly gradual, and in the latter sudden.

Marchand brings fresh evidence for the now accepted theory of partial decussation in the microscopical examination of a case, where the right optic nerve of a female aged 76 was found atrophied after her death, the disc being excavated as in glaucoma. The tract, chiasma, and nerves were stained *en masse*, and then sections in the plane of the forehead made with a microtome with the result of showing that one portion of the atrophic nerve-fibres passed through the upper outer border of the chiasma (without crossing) into the upper segment of the tract of the same side, while the other portion passed gradually over to the tract of the opposite side appearing at its lower border rather to the median side of its centre.

This quite corroborates the results of Baumgarten's case (quoted by Mauthner, *Gehirn, und Auge*, p. 424), and is also in accordance with the course of the fibres as described by Gudden in a similar case (von Graefe's *Archives*, xxv. 4, p. 237). Purtscher has described six cases of one-sided atrophy of the optic nerve (von Graefe's *Archives*, xxvi. 2, p. 191), where the microscopical examination lead to essentially similar conclusions as to the course of the fibres in the chiasma. Since Nicati's experiments (Nagel's *Jahresbuch*, 1878) the partial decussation of the optic nerves has been a demonstrated fact for cats, and a highly probable inference for all higher mammals, but we may now regard the actual course of the fibres in the human chiasma as settled by the above pathological observations. In the tract close to the chiasma the crossed bundle lies in the lower median quadrant, and the uncrossed bundle in the lateral upper quadrant. These conclusions receive additional confirmation in the succeeding paper.

Vossius comments upon the opposing theories as to the course taken by the macula fibres in the optic nerve, and declares himself emphatically for Leber's view (that they run peripherally in the temporal side of the nerve) as opposed to Förster's and Magnus' (that they lie axially). He brings forward the following case in support of this view :—A man, aged 48, a moderate drinker, who had been treated by Prof. Schweigger for central scotoma some three years previously, came into hospital with partial right hemiplegia, which soon afterwards became complete. Speech defective, left pupil smaller than right, and reacting better to light. Field of vision apparently normal, and ophthalmoscopical appearances perfectly so. After death a large softening was found in the anterior central convolution, and in the posterior portion of the upper frontal convolution. The microscopical appearances in the nerves, chiasma, and right tract (the left tract was not examined) were identical with those described by Nettleship and Samelsohn (*vide* O. R., vol. 1, p. 310), so far as the orbital portions of the nerves were concerned, and in the intracranial portions the observations of Marchand (*vide* p. 86) were corroborated, the macula fibres separating in the chiasma just in the same way as all the fibres of the optic nerve did in Marchand's case. Vossius draws the conclusions that the macula fibres running at first in the ventral surface of the tract and in its upper outer quadrant in two perfectly distinct bundles, become more dorsal in the chiasma, and in the intracranial portion of the nerve lie almost exactly central in the form of a horizontal oval. This oval gradually becomes more vertical, and moves over towards the temporal border of the nerve, which it reaches about the place of entrance of the central vessels. From this point onwards it assumes the form of a wedge, occupying the lower outer quadrant of the nerve, the apex of the wedge being in the centre.

Vossius considers the cause in his case to have been a neuritis in the whole district between the foramen opticum and the papilla, and consecutive atrophy in the intracranial portions of the nerves, the chiasma, and the tracts. In Samelsohn's case the inflammatory changes were best marked in the foramen opticum, and in the region of the porus opticus of the right eye, and he holds the primary affection to have been neuritis in

the upper portion of the nerve, while the more distal changes were due to consecutive atrophy. It is a pity that in neither case could a microscopical examination of the macula be carried out; but in both atrophy of the ganglion cells was found on the temporal side of the papilla. In Nettleship's case the retina also eluded examination.

It would not be right to conclude this notice without referring to Stilling's work on the chiasma and optic tract (Berlin, 1882), of which the present writer has only an abstract before him. He, it seems, considers there is a commissure uniting the right and left retinae in the anterior border of the chiasma, and reckons the uncrossed fibres as far more numerous than the crossed. He is asserted to have traced some of the fibres of the tract through the pes of the crus cerebri to the medulla oblongata. In the optic nerve, however, he finds three kinds of uncrossed fibres—(a) from the tract, (b) from the tuber cinereum, and (c) from the subst. perfor. anterior, and two kinds of crossed fibres—(a) from the opposite tract, and (b) from the opposite retina.

AUG. CHARPENTIER. Colour-Perception at the Periphery of the Retina. *Archives d'Ophthalmologie*, Vol. III., p. 12, 1883.

The writer describes some experiments recently undertaken in order to demonstrate the fact already established that there is at no part of the retina a sudden interruption of the sensibility for colours, but merely a progressive enfeeblement of the colour-sense from the centre to the periphery, and that colours can be recognised at the extreme periphery of the visual field, provided only that they are of sufficient intensity. The portion of the visual field selected for experiment was the extreme outer part of the horizontal meridian, as being farthest removed from the fixation-point. A small electric lamp which presented a luminous point of intense brilliancy was placed opposite the temporal side of the perimeter at 90°, which had been found to be the limit for white light in the cases experimented on. A

screen was arranged so as to prevent the possibility of any rays being reflected on to a more central portion of the retina, and coloured glasses, red, green, blue, and yellow, were held in turn before the luminous point. These colours were recognised with ease.

It thus appears that peripheral colour vision depends upon the brightness and not upon the size of the coloured test-object, as had been supposed by Aubert (*Graefe-Saemisch Handbuch*, vol. ii., p. 541, 1876). Landolt indeed had previously shown that colours under intense illumination are recognised at the extreme periphery of the retina (*vide* Snellen and Landolt, *Graefe-Saemisch, Handbuch*, vol. iii., p. 69, 1874).

J. HIRSCHBERG (Berlin). *Retinitis Centralis Punctata et Striata.* *Centralblatt f. prak. Augenhe.*, Nov., 1882, p. 330.

The author publishes two cases of this affection in connection with Mooren's description of *retinitis punctata albescens* (*Fünf Lustren Ophth.*, *Wirksamkeit*, p. 216).

CASE I. A woman, aged 59, suffering from atheromatous arteries, palpitations without organic disease of heart, and hæmoptysis without any physical sign of chest affection, suddenly became affected in her right eye with loss of sight, and subjective light sensations. The urine contained neither albumen nor sugar—sp. gr. 1,018 $V = \frac{1.5'}{cc.}$. Field normal, except for a central scotoma of about 8° radius. In the retina the only abnormality was a mass of numerous extraordinary fine white dots between the fovea and the papilla, the later being perfectly normal. Some three weeks later a similar mass of white dots formed a ring round the fovea itself, and these after about another month appeared as fine fan-like streaks radiating from the macula. Four weeks afterwards there lay a delicate star with fifteen rays between the disc and the macula, the latter being itself surrounded with a figure like a St. Andrew's cross; all these were formed by delicate white points and short white streaks. When the patient was seen six months later there was no trace of the retinal affection, and the vision

of the eye was as good as that of the other one. She died some nine months afterwards with secondary pneumonia, and general anasarca, vision remaining good till the last.

CASE II. A woman, aged 58, with old-standing gastritis, and with a healthy heart and vascular system, complained of a small central scotoma and micropsia in the left eye. The urine had a sp. gr. of 1,019, was free from albumen and sugar, but contained a considerable quantity of free uric acid, which was absent in specimens examined some months later. Left V = $\frac{1}{x} \frac{5}{x}$. Field normal, except for a small relative scotoma in centre, and a second one beneath the position of the papilla. The ophthalmoscope revealed a large retinal hæmorrhage above the papilla, and a very fine whitish exudation in the fovea, round which there lay an extremely delicate white stippling, so faint that in the inverted image it was hardly visible at all. The hæmorrhage gradually began to absorb, but very minute white exudations appeared near the temporal border of the papilla, from which a delicate whitish stippling stretched to the fovea. By degrees this exudation near the fovea began to assume the shape of a half star with five rays, while the portion near the disc appeared as a delicate retrovascular network. Later still the half-star was formed of some twenty rays, in some of which glittering points like crystals were visible. This all lay beneath the blood vessels, which were perfectly normal. After a visit to Ems these ophthalmoscopic abnormalities began to disappear along with the central scotoma, and vision improved. The scotoma below position of disc remained.

J. HIRSCHBERG (Berlin). Syphilitic Disease of Retinal Arteries. *Centralbl. f. prakt. Augenheilk.*, November, 1882.

A man, aged 39, who had two years earlier suffered from a venereal sore and an inguinal bubo, presented the following symptoms and appearances in his left eye :—V = $\frac{1}{xx} \frac{5}{x}$; field normal; slight haze of the disc, and enlargement of the veins; an opacity in the vitreous about 1 mm. in front of the papilla, like a delicate veil with a dozen reddish-brown dots scattered over it. Besides this, denser membranous opacities in the vitreous and a small hæmorrhage over a cilio-retinal vessel,

which took the place of the arteria temporalis inferior. Some three weeks later there was observable, in addition to opacities in the vitreous, well-marked white peri-vascular streaks surrounding the arteria nasalis inferior, from which delicate white lines passed perpendicularly into the retina on either side. More peripherally the affected artery plunged into a system of bluish spots, chiefly lying in the retina, but partly projecting into the vitreous, and it terminated in a branched arrangement of red lines covered with retinal hæmorrhages. After treatment—mercurial inunction, etc.—the blood became absorbed, but the other appearances remained unaltered. The importance of this observation is somewhat lessened by the absence of demonstration of the presence of syphilis.

E. LANDOLT (Paris). Peroxide of Hydrogen in Ocular Therapeutics. *Archives d'Ophthalmologie*, Sept.—Oct., 1882, p. 385.

Landolt affirms, after a careful and extended trial, that the peroxide of hydrogen is of very positive value in ophthalmic practice. His paper contains a large amount of information concerning the chemical, physical, and therapeutic properties of the substance which will be useful to those who wish to test its action in the same way.

Peroxide of hydrogen (H_2O_2) discovered by Thénard in 1818, is formed during many chemical processes; it is ordinarily prepared by the action of dilute acids on the peroxides of the alkaline earths. The hydrated peroxide of barium is decomposed by dilute sulphuric acid, so as to form sulphate of baryta and peroxide of hydrogen. The solution obtained in this way contains 3 per cent. of its weight of pure peroxide of hydrogen, and is sufficiently strong for medical purposes. The anhydrous peroxide, which is prepared from the dilute solution, is a much more energetic substance, its decomposition being sometimes so violent as to develop light and heat, even with explosion; the dilute solution is free from any danger of this kind.

The dilute solution is a clear, colourless, inodorous liquid, with a taste something like that of cress. When pure it will remain unchanged for months or years, if kept at a low tempera-

ture and protected from light. Its stability is increased by the addition of small quantities of acids or ether, diminished by alkalis ; but, by increasing the stability in this way, the therapeutical activity is lessened, since the desired disengagement of oxygen, on which this depends, is hindered.

Peroxide of hydrogen is characterised by the readiness with which it yields free oxygen, its decomposition being differently affected by different substances. A large group of substances, organic as well as inorganic, decompose it by catalytic action—*i.e.*, they cause it to set free a portion of its oxygen without undergoing any chemical change themselves. With other substances a double decomposition takes place, they themselves combining with a part or the whole of the oxygen liberated from the peroxide of hydrogen. And in other cases, again, both bodies are decomposed, free oxygen being liberated from both.

Among isolated albuminoid substances fibrine is the only one which decomposes it by catalytic action, and the power is limited to one particular constituent of fibrine, namely, to the fine molecular granules which remain as an insoluble residue when fibrine is dissolved in hydro-chloric acid. Blood plasma and serum decompose it actively with formation of a copious froth of bubbles of oxygen ; the colouring matter of the corpuscles is destroyed, the blood becoming yellowish ; the corpuscles themselves are not destroyed, except by concentrated solutions. Connective tissue in all its forms, the tissue of the liver, articular and fibro-cartilages, and all the substances known as colloids decompose it in like manner. It is not decomposed by the white or yolk of egg, casein, milk, urine, urea, fats, pepsine, saliva, peptones, sugar, starch, or by the aqueous humour, lens, or vitreous body of the eye.

A temperature above 70°C . destroys the power of the aforementioned substances to decompose peroxide of hydrogen. Putrefaction, on the other hand, neither destroys the power in those substances which have it nor imparts it to those which have it not, which proves that it is not in the microbes of putrefaction that the power resides.

Among pathological liquids pus is remarkable for the energy with which it causes liberation of oxygen from the solution,

while its own corpuscles are not noticeably altered. Vaccine lymph, the matter from variolus pustules, and the liquid of acute pleurisy are no less active.

Peroxide of hydrogen has a powerful action in preventing and arresting fermentation. Thus, the organisms which promote the fermentation of yeast, acetic fermentation, and that of milk, are rendered inert by the addition of a few drops of it to the fluids in question. The liquid from a hydatid cyst was found when thus treated to remain without smell, whilst a portion not treated underwent the ordinary decomposition. In May, 1882, a series of observations on this antifermentive action of the peroxide of hydrogen were laid before the Academy of Sciences by Paul Bert and Regnard, and from them arose the suggestion that the substance might prove useful as an antiseptic in surgery. Béchamp has asserted that there exists in all albuminoid and gelatinous substances, both liquid and solid, such, for example, as white of egg, serum, blood, vegetable albumen, casein, fibrine, etc., a special ferment consisting of minute molecular granules—microzymes. It is these bodies which preside over the first acts of decomposition, determining at first a simple fermentation, producing alcohol, which then passes on to complete decomposition with the formation of micrococci and bacteria. Possibly they play an important part in the normal organism by promoting the fermentations necessary to the evolution of animal substances. It is probable that the peroxide of hydrogen, when subjected to the catalytic action of these microzymes, reacts upon them and renders them inert.

Excellent results have been reported in the treatment of wounds and ulcerations by this substance, unhealthy action being rapidly replaced by healthy formation of pus and cicatrization, and a decided superiority is claimed for it over carbolic acid, because it is non-poisonous, has no smell, and causes no pain on application. For the eye it has special advantages as an antiseptic, for here carbolic acid, alcohol, salicylic acid, etc., if sufficiently concentrated to be truly antiseptic, cannot be used without danger, while the peroxide of hydrogen acts energetically in solutions of such strength as to be entirely free from all danger.

When the solution is applied to a conjunctiva affected with purulent inflammation a froth, resulting from its catalysis by the secretion, is instantly produced. The inflammatory products are not destroyed by it, but their physical condition is so altered that they are readily removed from the inflamed surface, and all septic action is arrested, the micro-organisms in the pus being killed by the nascent oxygen. The application produces a sensation of pricking amounting possibly to slight, but never to severe pain. The conjunctiva examined ten minutes after the application, is found covered with a thin layer of fibrine, which will again catalyse the solution. After two or three applications this exudation is much diminished, and with each repetition the froth becomes less abundant, until it is hardly formed at all; pathological secretion is then at an end. Landolt mentions several cases of purulent conjunctivitis in infants and in adults, which were promptly cured by this application, after the use of lotions of boracic acid and dusting with iodoform without good result. The effect in such cases is to deprive the purulent secretion of its septic character, and, secondarily, to suppress it altogether. There still remains, as in all such cases, a papillary hypertrophy of the conjunctiva, which may be treated with caustics before the use of the solution is suspended. The author had not, as yet, employed it in a case of diphtheritic conjunctivitis, but recommends the experiment. In cases of corneal ulcer with purulent infiltration its action was excellent. A few drops of the solution were placed in the conjunctival sac, and brought thoroughly into contact with the ulcerated surface by friction of the lid; the manœuvre was repeated several times in the space of a quarter of an hour, and the ulcerative process was commonly at once arrested. When hypopyon was present cure was obtained by a continuation of the same treatment.

In the treatment of suppuration in the lachrymal passages Landolt now uses injections of the solution of peroxide of hydrogen instead of boracic acid, and with good result, although there are, of course, many cases in which the disinfection of the discharge does not suffice to restore the passages to their normal state. He suggests that it will probably do good service as an antiseptic in operations on the eye.

In the bibliographical list appended to this paper we find no reference to the work done by C. T. Kingzett, who, in 1874, after experimenting on the aërial oxidation of turpentine, observed the presence of peroxide of hydrogen in aqueous solutions of the products obtained; and turned the discovery to practical account by the introduction of the so-called "Sanitas" preparations, the antiseptic properties of which depend chiefly on this agent. In a recent article by Kingzett (*Brit. Med. Jour.*, Dec., 1882, p. 1087) references may be found to the successful use of peroxide of hydrogen by English surgeons, and to the relative merits of the several medicinal preparations.

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TWO CASES OF AMBLYOPIA ARISING FROM SEXUAL EXCESS.

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Having had my attention directed to Professor Hermann Cohn's recent paper (*Archives of Ophthalmology*, vol. xi., 4, p. 428) on the influence of immoderate sexual indulgence in producing certain remote effects upon the visual centre, I beg to supplement his list by the narration of two cases which I have had under my observation for some time, and which, I venture to submit, go further than any described by Dr. Cohn, inasmuch as in my cases there were actual ophthalmoscopic changes to be seen, while the symptoms in his cases were mainly subjective :—

J. R., a robust-looking miner, aged 18, was admitted under my care at the Manchester Royal Eye Hospital on the 22nd of December, 1881, complaining of defective vision. His vision on admission was fingers at 6 inches, each eye separately. A very careful ophthalmoscopic examination of the fundus was made; the media were clear and transparent; the retinal veins were very full, but not tortuous; the calibre of the arteries appeared normal; the optic discs were rather pale, but not dull looking; the stippled appearance was well seen in the centre, and there was considerable physiological cupping. The tension was normal. The field of vision, taken roughly with the ophthalmoscopic mirror, seemed normal, the perception of light being equally good all over. There was no nystagmus. One of my colleagues, who happened to be in the out-patient room at the time, pronounced the case to be one of atrophy of the disc, but in this diagnosis I did not concur, and my opinion was supported by Dr. Charnley and Dr. Griffith, who were good enough to examine the case with me.

The patient stated that his general health had always been excellent; he was of robust physique, and there was no sign of syphilis, hereditary or acquired. The heart was examined, and found normal. His father died some time ago of bronchitis;

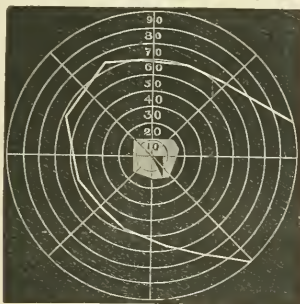
his mother is alive and healthy. He stated that he noticed the sight of his left eye begin to fade very gradually twelve months ago ; then the right eye slowly became affected ("as gradually as it could possibly go"), and vision became obscured in the same insidious manner in the course of a few months. He was able to work as a miner up to the beginning of last August, but he had not been able to read for seven months previous to his presenting himself at the Hospital.

He volunteered the statement that he had been in the habit of masturbating several times daily for the last eight years ; he had learned the habit at school, and had masturbated for twelve months before the orgasm was followed by a discharge of seminal fluid. He has continued this practice up to a few months ago, when he found his sight failing so greatly that he became alarmed. At the age of fourteen he began to have relations with the opposite sex in addition, and since then he has had almost nightly sexual intercourse, repeated three or four times. He always remarked that his sight became much worse after sexual indulgence ; his virility is still unimpaired, and he has never contracted any venereal complaint.

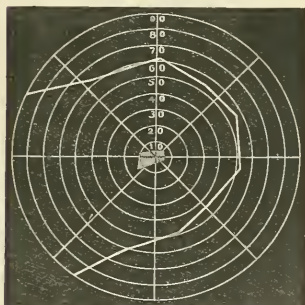
The treatment adopted was the administration of thirty grain doses of bromide of potassium three times a day ; but it had to be stopped after a week, as the patient complained of much pain in the temple and back of the head, always increased by a dose of the medicine. He looked pale, and not so well as when admitted, so grain doses of quinine were substituted for the bromide. Vision had now improved to fingers at nine inches. The field of vision was taken by the perimeter, and found to be normal in extent ; a scotoma was not suspected, and therefore not looked for. A few days after this he had a slight attack of pleurisy, which confined him to bed for three days. He was then ordered to attend as an out-patient, $\frac{1}{40}$ of a grain of phosphorus being given twice a day.

Six months later, during which time the patient had taken the phosphorus irregularly, but had been strictly continent, he presented himself again, and his vision was found to have improved to No. 19 Jaeger, each eye separately. Owing to the great distance from Manchester at which he lived, he did not return again for another six months, which brings us down to the beginning of 1883. He still remains continent, but his

vision has not shown any further marked improvement. The ophthalmoscopic appearances are exactly as when seen first. The fields of vision were again taken, and found to be normal in extent, but in each eye a small central scotoma surrounding the fixation point was mapped out, as may be seen in the annexed fields, which are reduced from McHardy's perimeter chart; but owing to the extreme smallness of the fixing point in the left eye, it has not been possible to depict it in the chart.



CASE I. J. R. RIGHT EYE.



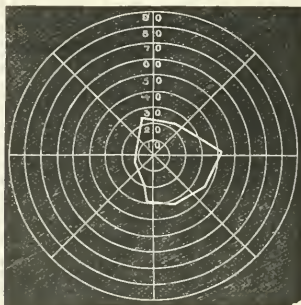
CASE I. J. R. LEFT EYE.

The shaded portion shows the central scotoma surrounding the fixing point. I may mention that the patient was an abstainer, and smoked very little. His colour-sense is normal.

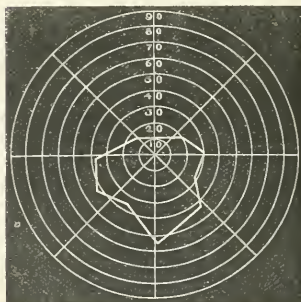
CASE 2. C. J., aged 25, a wire drawer, presented himself at the Hospital on the 4th of December, 1882, saying that his sight had been failing for the last three years. He was apparently in good health and there was no syphilitic history.

Right eye ... $Hm = \frac{1}{1.80}$ $V = \frac{6}{1.2}$

Left eye ... $Hm = \frac{1}{1.80}$ $V = \frac{6}{6}$



CASE II. C. J. RIGHT EYE.



CASE II. C. J. LEFT EYE.

On ophthalmoscopic examination the discs were found to be opaque, and chalky white, with a crescent of choroidal pigment on the nasal side in each eye; the arteries were thin and few in number; the veins were apparently normal in size.

The fields of vision were much and irregularly contracted. My diagnosis was that we had to do with a case of atrophy of the optic nerves. The colour-sense, however, was normal. The patient has never had any illness, and "does not know what a headache is;" his habits, as far as drinking goes, are moderate; he does not smoke; but he has masturbated regularly since the age of fifteen up to the date of his marriage a few months ago.

A quinine and strychnine mixture was ordered. On the 18th of December, $V = \frac{5}{8}$ in each eye separately, but the right deciphers it with difficulty. Since coming under treatment the patient has been very continent, owing to ill-health on the part of his wife; he is quite virile. On the 18th of February, 1883, the vision remained the same as in last report; the discs still looked chalky white, with slightly irregular edges, and the fields of vision remained contracted as shown in the annexed charts. He is still very abstemious in his conjugal relations, and expresses himself as feeling "first-class."

I think the conclusion to be drawn from the consideration of these two cases is that peripheral excitation of the generative organs, especially when commenced at an early age, and indulged in immoderately, does, as is popularly supposed by the laity, act prejudicially upon the function of vision. In the first case, where masturbation was commenced at school, and persisted in for eight years, it culminated in extreme amblyopia. In the second case, the evil practices indulged in for ten years seem to have caused a different train of symptoms, not so alarming to the patient, but which will probably prove more disastrous in the long run.

In the absence of any history of head injury, brain disease, or signs of antecedent optic neuritis, I must confess myself to be at a loss to account for the amblyopia in the first case (gradually recovering now the exciting cause is removed), or for the optic atrophy in the second, otherwise than by attributing it to exhaustion of the nervous system from repeated discharges of nervous force, acting upon the visual centres.

Though I am loth to suggest that masturbation is at the root of amblyopia in as many cases as Dr. Cohn seems to believe, I am certain that it will be found to be present as a potent factor in many obscure cases, if a little inquiry upon this delicate point is made. At the same time I grant the extreme difficulty of obtaining the truth on this head unless the habit is freely avowed by the patient.

I must here express my indebtedness to Dr. A. H. Griffith for the care and patience he has bestowed upon the repeated verification of the fields of vision, and for the conciseness of the record of the cases with which he has furnished me.

THE EFFECTS OF THE ELECTRIC LIGHT ON THE EYE.

By A. EMRYS-JONES, M.D.,

SURGEON TO THE ROYAL EYE HOSPITAL, MANCHESTER.

As this subject has been but little discussed so far, Dr. Rockcliffe's case (O. R., vol. i., p. 308) being the only one which I have seen reported, the following notes of cases that occurred in the practice of my friend Mr. Philip Birch of Longsight, to whose courtesy I am indebted for permission to publish them, may be of interest to the readers of the Review.

CASE I. Mr. A. consulted Mr. Birch on the 15th of December, 1882, and gave the following history of his case :— On the evening before, he had been making some experiments on the electric light, which necessitated his gazing intently with the naked eye at the arc from a distance of *a few inches*. Finding no inconvenience at the time, and that the longer he looked the more accustomed his eye became to the light, he continued his observations for about 20 minutes. On leaving off he found his eye rather dazzled, and on going into the street he noticed coloured circles round the street lamps. He went

home and awoke about 3 a.m. with intense pain in the eyes and profuse lachrymation. Next day Mr. Birch found these symptoms still existing, and also photophobia, and slight redness of the conjunctiva. The lids were not swollen. A drop of atropine instilled into the eye gave instant relief, and as soon as the physiological effects of the atropine passed away the patient was able to resume his work.

The following description, written by the patient himself, is so good and instructive that both Mr. Birch and I think it best to publish it as it stands :—

CASE II. The patient writes :—“ Having a great deal to do with electric lighting I have learnt a little caution, and can generally trick the glare without goggles by looking between two fingers held closely together, the hand being outspread before the face ; but in long-continued experiments I occasionally get caught through momentary forgetfulness. I may say that with an average arc light, called 2,000 candle power, none but transient effects are certain when the light is looked at from a distance of 12 feet or more, if the gaze is not continuous. In the worst cases, which generally arise from adjusting the lamp while burning, without goggles or smoked glass, the distance of the eye would average from 18 to 24 inches, and with weak eyes *one minute* will produce certain inflammation, and I think *two minutes* would do so in all cases. Longer exposure to the glare might cause blindness. Much depends on the nature of the light, as I find that either an excess of current which produces a violet light, or a defect of current which gives an orange light, is less injurious than the normal (white, tinged with ashy blue) light. Again an intermittent or fluctuating light is far more dangerous than a steady one.

“ The first symptom is a continuous impression on the retina of a multitude of duplications of the arc, or if the eye has moved much, a blinding glare which is for a time exceedingly confusing, and forms a kind of screen to all objects looked at afterwards. The first impression is of the same colour as the arc ; very soon it changes to its complimentary colour ; this lasts longer, and ultimately disappears, but only very gradually in the worst cases. When it has disappeared altogether it may be recalled for a long time by repeatedly and quickly opening and firmly closing the eyelids. 1

always estimate the extent of the mischief by the length of time during which I can recall the image ; if it endures an hour I know inflammation will follow, and apply my remedy at once without waiting the development.

“When inflammation sets in, I find it always does so within from six to nine hours, six being the minimum. The first sensation is that of one or two and sometimes innumerable particles of dust—and terribly angular particles they seem—on the eyeballs, which cannot be moved. It seems to me that there is a separate quasi particle for each of the images which at first existed. When the glare or confused image occurs the feeling is that I could keep a street going with dust if I could only get it out of my eyes. Almost immediately a copious discharge of tears sets in which lasts for hours ; the pupil of the eye becomes more or less dilated according to the severity of the attack, but the eye is very little bloodshot then or afterwards, so far as I can ascertain. On the subsidence of the inflammation the eyes are very sore, tender, and intolerant of light, and I find great relief, as soon as I can keep them open, to go out into the open air and face the wind : I then soon forget my trouble.

“As to treatment, I have always bathed my eyes well with a solution of sulphate of zinc and liquor opii, letting it get well under the eyelids, and in the interval keeping a cloth moist with the lotion firmly bound over my eyes. I move my eyeballs about in every direction until I find a position where absolute tingling disappears and the least pain is felt, and having found it I devote all my energies to retain that position, and to this I think I owe my quick recovery in all cases more than anything else. (!) The pain is horrible while it lasts, and no one will voluntarily incur it a second time. I have had about three attacks, the last being the worst ; but lamps may come to grief or an experiment fail before I invite another. . . . I have never noted any swelling of the lids.”

From these reports I conclude that the symptoms are decidedly due to the brilliancy more than to the radiant heat of the lamp. It is easy to understand that retinal mischief may follow a too prolonged exposure without the protection of coloured glasses. Such glasses should be worn by all who are compelled to adjust or to experiment with these lamps.

M. REICH (Tiflis). Neurosis of the Visual Nerve-apparatus caused by the Continuous Action of Bright Light. *Von Graefe's Archiv.*, XXVI., p. 135, 1880.

R. DEUTSCHMANN (Göttingen). Blinding of the Retina by direct Sunlight. *Von Graefe's Archiv.*, XXVIII., III., p. 241, 1883.

The dangers which attend an exposure of the eye to an excess of light have assumed a fresh practical importance since the application of electricity to lighting purposes (*vide* Rockliffe, O. R., vol. i., p. 308, and Emrys-Jones, vol. ii., p. 106), and it is interesting, in this connection, to notice what has been made out concerning the ill effects of undue exposure to sunlight reflected and direct.

Reich describes an epidemic of "snow-blindness" which he investigated, in face of considerable difficulties, in March, 1880. It occurred among a body of labourers engaged in clearing a way through masses of snow which obstructed the road between Passawaur and Mrleti in the Caucasus. The rays of the sun, reflected from the vast stretches of snow on every side, and from the water trickling over the melting surfaces, produced an intense glare of light which the unaccustomed eye could not support without the protection of dark glasses. A few of the sturdiest among the labourers were able to work with impunity, but the large majority, and especially the weakly and anæmic, suffered severely in their eyes in spite of various improvised attempts to protect them from the light.

Among about 70 strongly-marked cases, 30 were so severe that the men were absolutely unable to continue their work or to find their way home. They were collected in a covered place where Reich found them on his arrival, prone on their faces, striving to hide their eyes from the light, and crying out from pain.

Photophobia was present in all cases; very intense in some, any attempt to inspect the eye causing profuse lachrymation and sneezing. These latter cases were examined at night with a candle. In the worst cases the men could not open their eyes even in almost total darkness.

Hyperæmia of the conjunctiva with more or less injection of the ciliary vessels and even chemosis of the ocular conjunctiva

was found in all the severe cases ; those with chemosis complained the most of pain.

Secretion from the conjunctiva was not abundant ; pronounced catarrhal conjunctivitis was seen in only two or three cases ; in no single instance was the cornea affected.

Pain in the eyes, generally of a cutting character, was complained of by all ; the pain did not cease in darkness.

Strong contraction of the pupil was found on examination in every case excepting two, and interfered greatly with the examination of the fundus. In the two cases excepted, the pupils were dilated ; both these patients had been ill four days, and had worked on in spite of it for two days ; they appeared to have some degree of retinal anæsthesia and contraction of the visual field although the susceptibility to light was increased ; the ophthalmoscope showed capillary hyperæmia in the discs and some overfulness of the retinal arteries and veins ; ciliary injection and chemosis were present in both cases, and the tension appeared to be somewhat in excess.

The treatment which gave most relief was the use of warm or tepid fomentations ; cold applications were seldom well borne. Exclusion of light was the first essential.

The pain and spasm of the lids did not subside rapidly in spite of careful exclusion of light, but disappeared gradually in the course of some days or weeks, according to the severity of the case.

The author gives no details as to visual acuity, but declares that the impairment was not of the nature either of hemeralopia or of nyctalopia—meaning by the latter the condition in which vision is persistently defective in ordinary light, improved in diminished light. He points out that conjunctivitis played a very unimportant part in the affection, the conjunctival hyperæmia being due to reflex dilatation of vessels through the action of light, rather than to any direct influence of cold, dry, or rarified air. Were the latter an active cause, cases of conjunctivitis should be much commoner at great altitudes than they actually are. Among one hundred and fifty men examined no case of trachoma was met with.

Deutschmann records some striking cases of damage to the eye immediately caused by watching the eclipse of the sun on

May 17th, 1882 ; he also relates the results of a series of experiments undertaken for the purpose of elucidating the pathology of the affection.

Four cases of this kind came under observation ; three of them within a few days after the accident, the fourth two months afterwards.

Three of the patients had gazed at the sun with the naked eye, in the other case a dark-blue glass had been used.

Each one of them had noticed, immediately after gazing at the sun, a dark or semi-blind patch in the middle of the field of vision, and in each a small positive central scotoma was found on examination ; in no case was the scotoma absolute.

Gradual improvement occurred in all, but in no case was absolutely perfect vision recovered.

The degree of impairment, as determined by test-types, was remarkably alike in all the cases ; in the three examined within ten days of the eclipse there was $V = \frac{20}{50}$, and considerable improvement followed later ; in the case first seen two months after the eclipse, improvement had already progressed considerably, and there was $V = \frac{20}{30}$. All the patients read the finest print, but with difficulty.

The ophthalmoscope showed corresponding changes in all—viz., in the cases seen early, a small bright white spot at the centre of the macula lutea, and around this a blood-red ring shading off into the normal colour ; and in the older case, an appearance less easily distinguishable from that of the normal eye, and similar to that which the other cases presented when recovery was nearly complete.

In pursuance of the question suggested by these cases Deutschmann ascertained by experiment, as Czerny had previously done, that well-defined structural changes are produced in the retina of the rabbit when the direct rays of the sun, condensed by a concave mirror and then rendered parallel by a convex lens, are caused to enter the dilated pupil. After exposure for only a few seconds the retina presented to the ophthalmoscope a silvery white patch surrounded by a dark brown-red ring. Microscopic examination showed that the material changes consisted in an actual disorganisation of a limited area of the retina by coagulation of the albumen in its tissue, and beneath and around this a vascular reaction in the choroid,

leading to hyperæmia, exudation, diapedesis of blood corpuscles, and pigment disturbance. In order to ascertain whether the invisible heat-rays were concerned in producing these changes, the pencil of light was caused to pass through a stratum of water two decimetres thick before reaching the eye; the same effects as before were obtained, but required rather longer for their production. This exclusion of the influence of the *invisible* heat-rays does not exclude *heat* as the essential cause of the mischief, for the light-rays also raise the temperature. Dark glasses did not suffice to prevent the damage to the retina.

The similarity between the effects obtained in this way and those observed in the human eye (although the condensation of the light and the dilatation of the pupil in the former case introduce an important difference in the conditions) seem to justify the inference that the actual lesion in the latter case also is a destructive coagulation of albumen in an extremely minute area of the retina—a portion only of the fovea centralis—which is incapable of complete repair, together with congestive or inflammatory changes beneath and around this spot—swelling of retinal tissue and intense hyperæmia of the adjacent choroid—which in process of time disappear.

Examination of the eye, in the case of the rabbit, after all active changes had run their course, showed changes closely resembling those which are found in choroiditis disseminata; hence Deutschmann inclines to the belief, expressed by many authors, that exposure to dazzling light is a not unfrequent cause of this affection. Possibly some evidence of such a connection may be found among furnacemen.

If we compare these two groups of cases, it appears that the symptoms are more severe in snow-blindness than in blinding by direct gazing at the sun, but that they are also more capable of complete resolution. In the latter case the lesion of the retina is doubtless more pronounced as far as it extends, but is limited to a very small area, and calls forth no widely-spread vascular reaction; in the latter there is probably, without actual lesion, an excessive stimulation of the whole retina, and corresponding thereto a general hyperæmia of the whole uveal tract, producing severe pain, visible injection in the ciliary region, and even chemosis.

PONCET (de Cluny). Optico-ciliary Neurotomy. *Progrès Médical*, July 15, 1882. *Annales d'Oculistique*, July—August, 1882, p. 74.

The literature of this subject has already become voluminous. The author selects three of the most recent and important papers, and weighs the merits of the operation according to the evidence which they supply. The papers referred to are by O. F. Wadsworth (*Transact. of American Ophth. Society*, 1881; *Landesberg* (*Klin. Monatsblätter f. Augenheilk.*) and F. Krause (*Archives of Ophthalmology*). Wadsworth's experience relates to fifteen cases. In ten of these the operation was successful in arresting pain in the blind eye, or sympathetic irritation. In seven cases the cornea retained its transparency; it became opaque or ulcerated twice; and in another case suppuration was imminent. One eye had to be enucleated subsequently to the neurotomy, and in another case enucleation was advised, but refused by the patient. In two cases the operated eye atrophied. Hæmorrhage and exophthalmia were not uncommon immediately after the operation, but were temporary. The sensibility of the cornea was re-established to a greater or less extent in six (? seven) out of the fifteen cases.

Landesberg records twenty-three cases, with results not inferior to those of Wadsworth. Enucleation had to be performed six weeks after the neurotomy in one case; necrosis of the cornea occurred in three, keratitis in one, return of corneal sensibility in four. On the whole it may be said that the result was good with regard to the object in view in sixteen out of the twenty-three cases.

To the foregoing statistics the author adds that among fifteen cases in which neurotomy was performed by Bunge, suppuration occurred only once, and consecutive enucleation was necessary only once.

Thus, a total of fifty-three cases furnished three consecutive enucleations. Destruction of the eye or of the cornea by suppuration appears to have occurred five times. With regard to other unfavourable results Leber has published a remarkable case of sympathetic ophthalmia setting in after neurotomy, and Hirschberg, a disastrous one, in which neurotomy was twice performed upon the same eye at an interval of one month, and enucleation was required after all. Hirschberg has also ob-

served the return of corneal sensibility nine times, and in four cases has performed consecutive enucleation. These latter cases cannot be included in the general summary of statistics, because the total number of the neurotomies to which they belong is not ascertainable.

Poncet attaches little importance to the minor accidents which frequently attend the operation—namely, the free hæmorrhage into the orbit and the protrusion of the eyeball; they are temporary only, and yield rapidly to, or may be prevented by, a compressive bandage, and they seldom interfere with the final result.

The frequent return of sensibility in the cornea a phenomenon little expected when neurotomy was first proposed is interesting from a physiological point of view, and is of crucial importance in deciding the merits of the operation. The anatomical explanation of it has been carefully investigated by Krause, and his results, although not accepted as definitive by Poncet, are certainly of much value. He examined four eyes enucleated by Hirschberg subsequently to neurotomy. The interval between the operations varied from two months to two years. Longitudinal sections were made through the sclera and posterior connective tissue, especially in the region of the optic nerve entrance, so as to study the condition of the ciliary nerves immediately after their entrance into the eyeball. In the most recent case (two months) Krause discovered atrophied nerves scarcely fewer in number than the nerves of the normal sclera; and, in addition to these, a number of others hardly differing in appearance from normal nerves, except in a superabundance of nuclei. After a somewhat longer interval (three months and a half) the atrophic nerves were no longer visible, but there was an abundance of normal, or nearly normal, ones; and after still longer intervals the latter appeared normal in all respects. From a comparison of these observations with the results obtained by various experimenters, the process which follows the division of the ciliary nerves in the operation of optico-ciliary neurotomy appears to be this:—the peripheral nerve-ends (those in the eyeball) undergo total atrophy, and shortly disappear, while the central nerve-ends (surrounding the stump of the optic nerve) grow forward through the cicatricial tissue, and enter the eyeball

along those paths which offer the least resistance ; it is possible that they occasionally follow the track of the old nerves. Although physiologists have shown that a direct reunion of nerve-trunks may be obtained by a careful application of the cut extremities, such a reunion is hardly conceivable in the present case, and the idea is impossible when, as in three of these cases of Hirschberg's, the eye was intentionally caused to deviate from its normal position by advancing one or other of the tendons. In two of the eyeballs examined Krause found that the regenerated nerves were decidedly more numerous, and at the same time much smaller in diameter than the nerves of the healthy eye.

Summing up his review Poncet declares very favourably for the operation of neurotomy, and formulates the indications for it somewhat as follows :—Employed early it is a means of preventing the occurrence of sympathetic ophthalmia. It may be employed to remove the ciliary pain and tenderness of a blind eye. It is justifiable as a means of rendering the eye non-sensitive, and thus preparing it for the reception of an artificial eye. In such cases the results are good, and there are no accidents ; pain soon disappears, the patient resumes his avocations, the eyeball is well prepared for the artificial eye ; in short, the end desired is attained. On the other hand, it is less useful as a means of arresting sympathetic mischief when this is already established, and, like enucleation, it may be considered contra-indicated in presence of acute inflammation, whether of the first affected eye or of its fellow.

This summary, favourable though it be from the author's point of view, does not, we think, greatly strengthen the position of the operation under consideration. It shows plainly that optico-ciliary neurotomy is not a *certain* means of removing once for all the dangers and inconveniences which belong to a disorganised eye. Apart from the minor disadvantages immediately attending the operation, there is the possibility of necrosis ; there is the more than possibility of a return of sensibility, which will make the wearing of an artificial eye impossible, and may lead to more serious troubles ; and there is the chance that another operation may be required. We have in enucleation an operation which is simple, almost absolutely safe, and very quickly recovered from, which per-

mits a very satisfactory adaptation of the artificial eye, and, most important of all, which is *final* as regards the offending eye, and gives the maximum attainable security to the other. It is not surprising that some patients, unable to comprehend all the bearings of the matter, should be willing to submit to a division of nerves, though they resolutely decline the removal of the eye; but there are very few, we think, who, were they able really to judge for themselves, would not prefer to obtain the more certain and lasting relief which only enucleation can give.

PFLÜGER (Bern). Hæmorrhage into Petit's Canal.
Ophthalmic Clinic of the University of Bern. Report for the year 1881. Bern, 1883.

Extravasation of blood into Petit's canal is figured in Jäger's Atlas, but no other instance, the author believes, has been described. The condition is, probably, not so rare as this would seem to indicate, but has doubtless been overlooked. The appearance, when detected, is nevertheless so characteristic that a mistake of diagnosis is almost impossible.

In Pflüger's case the patient, a woman aged 52, suffered a sudden painless loss of sight in the left eye, from which she gradually recovered. Six months later the same eye suffered a second and similar attack, in which vision was reduced to mere perception of light. Four weeks after this—no improvement having taken place—the patient presented herself for examination. She had the signs of extreme anæmia, bronchitis, emphysema, and arterial degeneration.

Left eye: External appearances normal; pupil rather small, circular, movable; no red reflex obtainable from fundus; lens, on focal illumination, perfectly transparent; tension normal; light projection in all directions true and prompt. *Right eye:* Pronounced ptosis and myosis the appearances, namely, of extreme paresis of the sympathetic, concerning the onset of which the patient could give no information.

Partial dilatation of the left pupil having been obtained by atropine, a further examination was made by lateral focal illumination. The eye being turned strongly downwards, a sharply defined crescent of a bright red colour was seen at the lower margin of the lens, and by altering the position of the

eye and of the illumination this was traced completely round the periphery of the lens. The colour was that of fresh blood. The form and position of the ring, its complete fixity with regard to the lens-margin, and its sharp limitation from the transparent lens and from the uniform darkness of the vitreous, allowed of no other diagnosis than that of an extravasation of blood from the ciliary processes passing through the zonula into the canal of Petit.

For a year or more this blood-ring remained almost unaltered in colour, breadth, and continuity; later on a very gradual absorption was observable, the band becoming narrower and less regular in contour, and its colour paler in places. The lens remained for a long time quite free from any visible change; signs of such change were carefully watched for, because the nutrition of the lens might be expected to suffer through the partial blocking-up of the principal channel of its nutrient supply. More than two years passed before opacity could be observed commencing in the anterior and posterior cortex.

The long persistence of the blood in this situation, the retention of its normal colour, and the sharp contour of the ring, would seem to indicate that the interchange of fluid through Petit's canal is extremely slow; and, further, these observations support the view that a very large proportion of the fluid secreted by the ciliary processes passes directly forwards from posterior to anterior chamber, a very feeble stream only, passing backwards through the zonula for the purposes of the slowly-nourished vitreous. (On this subject, *vide* O. R., vol. i., pp. 249, 413).

The well-established fact that this annular space is actually a closed canal (*vide* Aeby O. R., vol. i., p. 351) is demonstrated afresh by this natural experiment.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, MARCH 8TH, 1883.

FREDERICK MASON, Esq., Vice-President, in the Chair.

Reported by DAWSON WILLIAMS, M.D.

The Chairman announced that at the meeting on June 7th a discussion will be held on the Relation of Eye-Disease to Disease of the Spinal Cord. Further particulars are given at page 123.

Ophthalmoscopic Appearances long after Embolism of the Central Artery. Mr. James Adams showed drawings of the fundus from a case in which sight had been lost suddenly in each eye—in the right twelve years ago, in the left one-and-a-half years ago. The arteries contained scarcely any blood, and many were thread-like; the veins here and there showed old inflammatory changes, and one large trunk in the left eye was “beaded.” There were also traces of old neuro-retinitis, and the maculæ were occupied by well-defined patches of choroido-retinitis; the changes were more advanced in the right eye.

Mr. Nettleship asked whether the choroidal changes were due to choroiditis, or to the swelling of the retina, which generally occurred after embolism. Choroiditis as a consequence of embolism must be extremely rare.

Mr. Adams believed the changes to be due to the exudative changes which occur after embolism. They did not amount to more than a disturbance of the pigment-layer. Such changes, would, he thought, be found more frequently if looked for.

On the Connection between Disease of the Eye and Affections of the Sexual Organs in Females.—Dr. C. E. Fitzgerald, in an elaborate paper, pointed out that, though a connection between diseases of the eye and affections of the genital organs in females would probably be admitted, literature on the subject was scanty. He related a case in which neuro-retinitis occurred some time after sudden cessation of the menses. The vision improved under treatment, and with the reappearance of the menses. In a case of disseminated choroiditis with floating opacities in the vitreous, multiple fibroid tumours of the uterus were found; it was possible that these tumours affected the circulation, so as to react injuriously on the delicate vascular tissue of the eye. Mooren had drawn attention to masturbation as a cause of retinal hyperæsthesia and accommodative asthenopia. The author mentioned three cases in which he believed this habit had acted injuriously upon the eyes. The subject was one of grave importance, and, however unpleasant, ought to be thoroughly investigated.

Mr. Jonathan Hutchinson agreed that the subject deserved investigation; it was generally avoided because of the difficulty of obtaining trustworthy facts. He had himself expressed the belief (R. L. O. Hosp. Reports, vol. ix.) that, in some cases, disease

of the eye was due to disturbance of the generative organs ; he thought that few cases of serious disease of the eye were related in any way to masturbation ; *muscæ volitantes* no doubt did in some cases depend on that habit. He had met with no evidence to support the theory that choroiditis disseminata, for instance, had any connection with uterine disease. He had seen cases of vitreous softening and opacities attributed by the patients to masturbation ; but, on the other hand, he saw many cases of grave derangement, indeed total wreck, of the nervous system due to the practice, without any changes in the eyes. With regard to uterine fibroids the evidence was even more vague.

Mr. Spencer Watson believed that many cases of chronic eye-disease became aggravated on the cessation of the menses ; great congestion of the head was then liable to occur, and, in chronic choroiditis, hæmorrhage into the choroid was a common accident ; in chronic progressive myopia, disastrous events, such as detachment of the retina, were apt to occur, owing, as he believed, to the congestion of the head.

Mr. A. H. Benson doubted the wisdom of classing masturbation as a disease of the sexual organs ; it was in reality a symptom, and was extremely common among lunatics. It was possible that the changes in the eye, and the habit referred to, were both the consequences of some one central nervous change.

Dr. Buzzard had seen many cases of disturbance of the nervous system from masturbation, but, in the eyes, nothing more serious than trouble of accommodation.

The Chairman had not met with eye-disease from disturbance of the sexual organs, except in so far as the eyes shared in the general debility.

Dr. Fitzgerald, in reply, said that his paper was merely suggestive. Investigation as to the influence of uterine tumours on the eye was desirable. In many cases, masturbation was independent of central lesion ; the most frequent eye-trouble was asthenopia ; the occurrence of that symptom, with evidence of irritation about the genitals, should raise suspicion.

Pulsating Exophthalmos.—Mr. Adams Frost showed a living case of pulsating exophthalmos in both orbits. The patient, a man aged 38, was run over when ten years old, and had symp-

tons of fracture of the middle fossa. Since then, there had been a pulsating swelling above the left eye, and a drumming noise in the head. Until the last few years, the left eye was very prominent; now it had ceased to be prominent, and he suffered no inconvenience. The eye was rotated inwards, and beneath the eye-brow was an oval swelling the size of a filbert; in the angle between nose and orbit there was a flatter and more diffuse swelling. There was pulsation in both swellings, and a thrill in the nasal portion. Above the right eye was a small soft pulsating swelling. A loud *bruit* was audible over the left orbit. Pressure on the left carotid arrested pulsation in both orbits. Mr. Frost believed the symptoms were due to fracture of the base crossing the left internal carotid artery, and establishing a communication between it and the sinus, which had led to varicose distension of the orbital veins, and that this varicose condition had extended by the transverse sinus to the veins of the opposite orbit. Necropsies of nineteen cases were on record; in the majority of these an arterio-venous communication was present, and in nearly all the pulsating swelling was formed by the distended orbital veins. Symptoms of fracture of the skull were frequently present in similar cases.

Mr. Higgins referred to Mr. Lansdowne's case of pulsating exophthalmos coming on after a wound of the orbit. Several enlarged vessels, at the inner angle of the orbit, where the wound had been inflicted, were tied, and the patient completely recovered. This seemed to show that an arterio-venous communication within the orbit might lead to pulsating exophthalmus.

Mr. A. P. Gould mentioned a case of pulsating tumour of the orbit, now under the care of Mr. Hulke, in the Middlesex Hospital. The common carotid was tied, and for a short time the patient appeared to be cured; but thrill had recently recurred. In another case (specimen in the Middlesex Hospital Museum) there were during life all the signs of pulsating exophthalmos, but nothing abnormal could be found after death.

Mr. Frost, in reply, observed that his case differed from others in that both orbits were affected.

Case of Sarcomatous Tumour of Iris: Successful Removal—
By Dr. Little.—A healthy woman, aged twenty, went suddenly

blind while stooping, and remained so for a week. On recovering sight she, for the first time, observed a spot on the coloured part of the same eye. Family history was good. On examination sixteen months later a tumour was found on the lower and outer quadrant of the iris, extending from margin to periphery, the size of a small pea, of a pale brownish colour, with a few fine vessels on its surface and numerous red points. The eye in every other respect was healthy ; vision was normal. Five months later the tumour had slightly increased in size. The tumour and corresponding piece of iris were removed through a linear incision made with a Graefe's knife, close to the corneo-scleral junction ; no bleeding into the anterior chamber. In three weeks the eye fully recovered ; $V = \frac{20}{20}$. Now, more than two years since the operation, there was no evidence of recurrence, and vision was normal. Dr. Dreschfeld found that the mass consisted of round cells, containing a large round nucleus, filling up nearly the whole of the cell, and showing in its centre one or more highly refractive nucleoli ; also a few spindle-shaped cells with nuclei ; a few cells contained brown pigment ; the blood-vessels were all of the embryonic type. The tumour was a pigmented round-celled sarcoma. A similar case is recorded by Kipp (*Archives of Ophthalmology*, 1876), and three others by Knapp (the same, 1879).

Diphtheritic Paralysis.—Mr. Arthur Benson, in a paper on paralysis of ocular muscles after diphtheria, gave particulars of a case in a girl, aged eleven. The primary throat-affection was cured in four weeks. The ciliary muscles, affected in the fifth week, continued so about seven weeks ; soft palate, affected in the sixth, remained so about two ; hearing, affected in the sixth, remained so about one ; levatores palpebrarum, affected in the ninth, continued so about one ; recti externi, affected in the ninth, two days after the levatores palpebrarum, remained so about three weeks ; convergent strabismus and diplopia, present during the tenth week, lasted about four days ; weakness of lower extremities began in the tenth week, and lasted about three ; numbness and tingling in the feet began about the tenth week, and lasted three weeks. He regarded paralysis of the ciliary muscle, without alteration of the condition of the iris, as the most frequent implication of the intrinsic muscles of the eye. The seat of the lesion was, he believed, in the brain and

spinal cord. He combated Hughlings Jackson's sympathetic theory on the ground that disease of the lenticular ganglion would cause change in the action of the pupil. The portion of the nervous system, lesion in which would cause isolated bilateral paralysis of accommodation was, he thought, Hensen and Voelcker's centre for accommodation in the hinder part of the floor of the third ventricle. The deafness on which Dr. Jackson laid stress as confirmatory of his theory of disease of the otic ganglion was more likely to be the result of the paresis of the palate with which it was accompanied than of interference with the nervous supply to the tensor tympani muscle. Paresis of both levators of the lids, and of both external recti muscles, as well as the frequent occurrence of paralysis in distant parts of the body, and perverted sensation, all disproved the sympathetic hypothesis. Ferrier had found that at the base of the first frontal, and extending partly into the second frontal convolution, there was, in the monkey, an area, irritation of which caused elevation of the eyelids. Disease of this centre would account for the bilateral ptosis. As to the nature of the lesion little was known. Post-mortem examinations had shown in many cases numerous hæmorrhages into the nervous centres. The author thought hæmorrhages, large or small, numerous or few, a probable cause. The symptoms would be severe in proportion to the extent and position of the extravasation. Small hæmorrhages might be absorbed with great rapidity, and have but little, if any, ill result; larger hæmorrhages would account for the hemiplegic and other grave forms which were met with at times.

Card Specimens. — Mr. Arthur Benson, drawings, viz. :—
 1. *Retino-Ciliary Artery, i.e.,* a branch from the central artery of the retina which apparently went to join the ciliary arteries by doubling back and penetrating the disc near its border.
 2. *Recent Spontaneous Detachment of the Retina*, showing a rent in its structure. 3. *Retinitis from Cerebral Disease*, simulating retinitis albuminurica. 4. *Retinitis Albuminurica* (typical).
 5. *Peculiar Condition of Vitreous Body*, with disease in the macula and metamorphopsia. 6. *Opaque Nerve-Fibres* (typical case), with some disease about the macula.

Dislocation of Lens, of twelve years' standing—Dr. Samuel West.—A woman, twelve years earlier, had "knocked her eye

against the corner of a table ;" vision at once became gravely affected. The right pupil was dilated to the extremest degree, and presented a notch on the upper part, corresponding with a linear scar in the sclerotic and cornea. The opaque lens lay free in the vitreous body, and moved with the eye : the optic disc and choroid were atrophied.

NOTICE.

It has been decided by the Council of the Ophthalmological Society to devote the meeting on June 7th to the consideration of the Ocular Symptoms which are associated with Diseases of the Spinal Cord. At the request of the Council, Dr. Gowers has undertaken to introduce the subject, and has prepared the following statement of the points to which it is desired that members should chiefly direct their communications.

MEMORANDA ON EYE-SYMPTOMS IN SPINAL DISEASE.

BY W. R. GOWERS, M.D., F.R.C.P.

Of the ocular symptoms associated with spinal disease, two are of especial importance on account of their frequency—atrophy of the optic nerve, and the states of the pupil.

Modern pathological investigation has rendered it improbable that these ocular symptoms are the *result* of the disease of the cord. They are associated almost exclusively with degenerative diseases, and probably depend on a degeneration which is not structurally continuous with that in the cord. They are almost unknown in acute diseases of the cord, except when these follow, or are followed, by degeneration which runs a practically independent course. Considerable interest will therefore attach to any cases that can be brought forward in which these symptoms were distinctly consecutive to an acute lesion of the cord.

Optic nerve atrophy is associated especially with locomotor ataxy, and the association may be considered from the side of the ocular and of the spinal affection.

In what proportion of cases of atrophy of the optic nerves can the signs of locomotor ataxy be detected? As the earliest and most constant of these signs, the loss of the knee-jerk may be conveniently taken as a criterion.

In what proportion of cases of locomotor ataxy do the optic

nerves undergo atrophy? It is not probable that a definite answer can be given to this question, because few cases of ataxy are followed to the end, so that the occurrence of atrophy cannot be excluded. But an approximate answer can be secured if the next question can be decided.

When does atrophy of the optic nerves usually commence in the course of ataxy? The course of *tabes* may, for this purpose, be conveniently divided into three stages—(1) before there is any alteration in gait; (2) when the gait is distinctly ataxic, but the patient is still able to walk, alone or with the aid of a stick; (3) when the patient is unable to walk without the help of another person. It is very important to know in what proportion of the cases of tabetic atrophy the change in the optic nerve commences in each of these stages. If the proportion of cases in which atrophy commences in the first stage is known, an approximate estimate of its total frequency can be formed from the number of cases in the second stage with and without signs of atrophy.

Can any relation be traced, in a series of cases, between the occurrence of atrophy and the character of the spinal symptoms (pains, anæsthesia, etc.)?

In what proportion of cases does tabetic atrophy affect one eye before and more than the other, and which eye is most frequently affected first?

Does concentric limitation of the field always precede, or preponderate over, central amblyopia in tabetic atrophy? In rare cases there are unusual changes in the field of vision (*e.g.*, temporal hemiopia). Observations on such cases are of especial importance, and so also are facts regarding acute failure of sight in this affection.

Does the atrophy always progress to total blindness, or does it sometimes become arrested, and remain stationary for an indefinite time, as does the spinal affection?

Can any instances of considerable and permanent improvement of sight in tabetic atrophy be brought forward?

Observations and microscopical sections illustrating the pathological anatomy of tabetic and other allied atrophies are desirable, especially those which show the condition of the optic chiasma and optic tracts.

In what respects does the optic atrophy of *tabes* differ from

the optic atrophy sometimes associated with other forms of chronic spinal cord disease?

When eye-symptoms occur in general paralysis of the insane, is the case more likely to be complicated with spinal symptoms?

States of Pupil.—The most frequent condition of the pupil associated with spinal disease is the loss of contraction to light, the pupil still contracting on accommodation (reflex iridoplegia, reflex rigidity of the pupil, Argyll-Robertson symptom). Erb has pointed out that in these cases the pupil no longer dilates on a painful cutaneous stimulation (*e.g.*, of the skin of the neck by a faradaic brush). Regarding this condition information is needed on several points.

Can this reflex dilatation be always obtained under normal circumstances?

What is the most convenient and efficient means of obtaining it in regard to (*a*) place and (*b*) form of cutaneous stimulation?

Is it true that there is always loss of reflex dilatation when there is loss of reflex contraction?

The pupils are usually small in this condition, but not invariably, and are sometimes not circular. It is desirable to know whether any relation can be traced between the size and shape of the pupils and other symptoms.

It is not uncommon to find, under the conditions in which reflex iridoplegia occurs, that the pupils contract under the influence of light, but immediately, the exposure continuing, dilate again to their former size, often with slight oscillations. Does this condition go on to loss of reflex contraction?

In total paralysis of the internal muscles—ophthalmoplegia interna (Hutchinson)—the pupils are not usually small. What variations in the size of the pupils are met with in this condition?

Regarding the association of these symptoms with spinal disease, it is desirable to know how frequently they are met with in locomotor ataxy and general paralysis of the insane, and in what other spinal diseases they occur.

Both symptoms occur apart from spinal disease, and facts are needed as to the other conditions with which they are associated, and as to their relation to constitutional syphilis. Does ophthalmoplegia interna begin as reflex iridoplegia?

Ophthalmoplegia externa has been shown to depend on nuclear degeneration. There is some reason to believe that reflex iridoplegia and ophthalmoplegia interna depend on a similar degeneration. Pathological observations on the nature of the lesion in these cases are much needed.

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CASES OF FOREIGN BODY IN THE CORNEA AND IRIS.

By FRANK H. HODGES, F.R.C.S. (EDIN.),
OPHTHALMIC SURGEON TO THE LEICESTER INFIRMARY.

The three following cases illustrate the different methods which may be employed in removing foreign bodies situated in the deeper layers of the cornea or iris:—

1. *Fragment of Stone in deep layers of Cornea.*—Samuel Cox, aged 20, whilst hoeing potatoes on May 24th, 1882, chipped off a fragment of stone, which flew into the left eye. Two days later a surgeon attempted to remove the fragment, and, failing, sent the patient to the Leicester Infirmary.

On examination a foreign body was found to be deeply impacted in the centre of the cornea. An attempt to elevate it with a spud was followed by the cornea giving way and the contents of the anterior chamber escaping. Iced compresses were applied, and the patient was kept in bed for a few days; then, under ether, the cornea over the foreign body was scratched through with a cataract knife, a needle was passed into the anterior chamber, and its side pressed against the fragment which projected into the chamber. The fragment was thus raised into the wound, seized by iris forceps and drawn out. Some reaction and pain ensued, which were treated by atropine leeches and a compressive bandage.

On June 17th a fistula which remained was touched with a camel's hair pencil which had been wiped across nitrate of silver. On June 30th the fistula was healed, and the lens and capsule were seen to be transparent.

2. *Fragment of Stone on Iris.*—Stephen Addison, aged 27, was admitted June 30th, 1882. A week prior to admission he was struck in the left eye with a fragment of stone from a hammer.

June 30th.—The eye was free from pain and but slightly injected. A foreign body, about the size of No. 6 shot, was seen on the periphery of the iris at its upper and inner quadrant. Under ether an incision was made with a Sichel's cataract knife; this incision was unfortunately too small, and the whole of the aqueous escaped during the attempts to seize the fragment with forceps; a compressive bandage was applied.

July 4th.—The wound having healed, and the anterior chamber being re-established, under ether an incision of about 4 millimetres was made with a Graefe knife in the corneo-scleral junction; the fragment, together with a portion of the iris, was seized with forceps and abscised. No reaction followed, and the patient left the Infirmary on July 18th, V. = $\frac{6}{36}$. At the present time (April, 1883) the eye as V. = $\frac{6}{12}$.

It was perhaps fortunate that the patient received no treatment until his admission into the Infirmary, for had belladonna or atropine been used with a view to keeping down inflammatory action, the stone fragment, situated as it was in the periphery of the iris, would probably have been jammed into the angle of the chamber, and have led to disastrous results. Only a few days after the dismissal of this patient I had an opportunity of witnessing an illustration of the serious mischief which may attend the routine use of belladonna in cases demanding prompt treatment of another kind. The patient, a healthy lad of 14, had been struck in the right eye by a fragment of a percussion cap, which had penetrated the cornea and lodged in the iris. He was brought to me as a private patient, eight days after the accident, by his medical attendant. The conjunctiva was chemosed, the anterior chamber nearly full of pus, and the lower third of the cornea was infiltrated. The surgeon informed me that immediately after the accident the fragment was plainly visible on the lower segment of the iris, and appeared quite superficial; that no treatment had been adopted except the application of belladonna lotion, and that acute pain, injection, and hypopyon had come on very rapidly.

In this case, I think, it was not only the delay in the removal of the foreign body which was to blame for the disastrous result ; I think it is likely that the ophthalmitis was set up or aggravated by the belladonna dilating the pupil and causing the copper fragment to be pressed into the angle of the anterior chamber, and possibly through the base of the iris into the ciliary processes. In a young healthy eye the action of the belladonna would naturally be vigorous, and the compression exerted by the fragment great. Percussion-cap injuries are very prone to ophthalmitis, but, as a rule, the fragment pierces the lens or ciliary region, and is lodged in the posterior part of the eye ; the superficial position of the fragment in the iris in this case and the absence of irritating applications to the eye, favours no other explanation of the subsequent ophthalmitis than the one given, unless it be that septic matter may have been conveyed into the eye by the fragment. It is scarcely necessary to add that the case resulted in excision, whereas had it come under the notice of an ophthalmic surgeon at first, the fragment would probably have been removed without difficulty, perhaps even without an iridectomy. I will conclude by narrating a percussion-cap accident where the early removal of the fragment was attended with the preservation of the eye.

3. *Percussion-cap Fragment in Cornea and Iris.*—On the evening of July 17th, 1882, William Allen, aged 19, was struck whilst watching a companion shooting for nuts, by a percussion cap fragment in the left eye. On admission next morning into the Leicester Infirmary an end of the fragment was seen projecting from the cornea, the other occupying the lower segment of the iris close to the pupillary border. There was very little injection or pain. Under ether the fragment was seized with forceps and drawn out ; it was very firmly impacted. No reaction followed removal, and the eye when tested a month later was found to have normal acuteness of vision.

ON THE FREQUENCY OF PAPILLITIS IN SYMPATHETIC OPHTHALMITIS.

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Is papillitis present in all cases of sympathetic inflammation of the eye, or is it only a secondary and subordinate condition which may or may not complicate the uveitis?

If constantly present, is it the first and earliest pathological appearance in the sympathising eye, or does it show itself only after the uveitis has become marked?

Clinically considered, uveitis in some form—whether as serous iritis or irido-choroiditis, “uveitis serosa,” or “uveitis maligna”—has hitherto been noted as the most constant condition of sympathetic inflammation, whilst comparatively few observations on the condition of the optic disc are on record. The subject is, nevertheless, one of much importance, both theoretically and practically; and the determination of these points would materially aid the investigations regarding the path travelled by the exciting influence from one eye to the other.

If, as Mackenzie believed, the optic nerve is the conductor, then papillitis in the sympathising eye would, presumably, be the earliest and most constant affection; whilst if the ciliary nerves be regarded as the conductors, the papilla would not be expected to exhibit as early or as constant changes. Leber, who supports Mackenzie's theory, “believes that the affection of the disc is always present, though not always conspicuous, being in some cases recognisable *in spite of* the obscured media, in other cases unrecognisable *because of* the obscured

media; and that the inflammation when once it has reached the eye spreads very quickly over the uveal tract and vitreous body" (O. R., vol. i., p. 7).

In looking over the cases of sympathetic ophthalmitis recorded by different authors, one is struck by the almost total absence of any account of the condition of the disc in the sympathising eye; and even where the appearances of the papilla are mentioned it is often in a casual way, without stating the degree of change that has taken place, or the time and mode of its onset. Thus, W. T. Milles quotes eleven cases of sympathetic inflammation after cataract extraction, but makes no mention whatever of the condition of the disc or retina in any of them (O. R., vol. i., p. 421). So also Lloyd Owen, A. Crichton, Frost, Snell, and a host of others report cases without any mention of this point. In Milles' cases the patients were presumably suffering from cataract in the sympathising eye, so that investigation of the condition of the disc was impossible. Nettleship, however, out of nine cases quoted, in which sympathetic inflammation appeared subsequent to enucleation of the causing eye, mentions neuro-retinitis as present in four (O. R., vol. i., p. 8). And Ayres gives notes of three cases of sympathetic inflammation, in one of which he says "The optic disc (of the sympathising eye) was swollen and œdematous, and the retinal vessels at its margin were blurred and considerably arched forward by exudation underneath." The condition of the disc in the other two cases was not observed. In commenting upon this case he says, "I feel confident that the optic nerve participates much more frequently than is supposed" (Archiv. of Ophthal., vol. xi., p. 199).

In the pathological examination of eyes enucleated in consequence of exciting sympathetic inflammation, neuro-retinitis or papillitis is a condition so constantly observed that it seems to merit more attention than has heretofore been bestowed upon it. Thus, Adolph Alt noted changes in the retina and optic nerve in 79 per

cent., whilst only $16\frac{2}{3}$ per cent. exhibited changes in the ciliary nerves (Archiv. of Ophthal., vol. v.) And W. A. Brailey, speaking of the conditions usually found in the causing eye, says "there is inflammation in and around the walls of the retinal blood-vessels, especially upon the papilla. Some optic neuritis is present, and also inflammation, which may be considerable or extremely slight in the intervaginal space of the optic nerve" (Transac. Int. Med. Congr., vol. iii., p. 35).

W. C. Ayres says:—"There seem to be at least two ways by which sympathy can be transmitted, or at least two ways in which it may demonstrate itself: one as *optic neuritis*, the other as *cyclitis*: or they may exist simultaneously . . . Those eyes which transmit sympathy within the first 15-20 days may cause it to make its appearance first in the papilla of the sympathising eye, whereas the others, which cause sympathy through the ciliary nerves, may produce it later." He quotes a case in which "neuro-retinitis" was noted in the *causing* eye, and four days later well-marked "neuro-retinitis" was noted in the *sympathising* eye (Archives of Ophthalmol., vol. x., p. 277). Mauthner also thinks that sympathetic inflammation may be propagated along either the ciliary or the optic nerves. That where a neuro-retinitis is present in the causing eye, papillitis might fairly be expected to show itself in the sympathising eye also. He says:—"It is quite an improper way of putting the question to inquire whether the sympathetic affection is conveyed over through the optic nerves or through the ciliary nerves, and whether the transmission is more frequently by one or the other way. The transmission can take place by both ways, but that is not to be understood as if one and the same pathological process can travel over at one time by one way, at another by another way. Along the optic nerves irritation and inflammation of the optic nerves is propagated, whilst along the ciliary nerves themselves the inflammatory process spreads, which is observed first

in those parts of the eye supplied by the ciliary nerves. There exists no doubt that the transmission may take place along both paths simultaneously or at intervals, so that many of the symptoms present in sympathetic uveal disease (for example, the functional disturbances) are not to be attributed to the uveitis, but to the neuroretinitis existing at the same time" (Vorträge a. d. Augenheilkunde, Band i., p. 75).

Deutschmann's experiments on rabbits seem to favour strongly the idea that the papilla should be the earliest structure sympathetically affected. Injection of a solution containing the spores of *Aspergillus glaucus*, into the vitreous or the trunk of the optic nerve of one eye, was immediately followed by inflammatory changes in the papilla of that eye, and after from six to fourteen days a similar well-marked papillitis, but of moderate intensity, was observed in the second eye. "Microscopical examination showed neuritis and perineuritis originating at the point of injection, and spreading hence through the commissure to the other nerve" (O. R., vol. ii., p. 22). These experiments and those of Pflüger (O. R., vol. i., p. 409) with fluoresceine prove the possibility of inflammation being transmitted from one eye to the other through the optic nerves and commissure.

If it be conceded that papillitis in the causing eye is followed by papillitis in the sympathising eye, its occurrence should be very constant, for it is hardly possible that an eye so injured as to produce sympathetic inflammation in the fellow eye could escape being itself the subject of papillitis, since the disc shows signs of inflammation (if not ophthalmoscopical at least microscopical) in almost all the severe inflammatory affections of the globe. Even in comparatively superficial wounds or ulcers of the cornea, and in iritis, increased haziness of the disc can, most frequently, be observed with the ophthalmoscope.

The following case seems to be one in which if the papilla was not the first of the ocular structures affected,

it was at least amongst the earliest to undergo visible change :—

Mary Ann N. aged 8 years (Reg., No. 443, 1881, S.M.O.H.) received a penetrating wound of the right eye from the blow of a stone on October 4th, 1881. The wound was in the ciliary region, and through it bulged part of the iris and some vitreous humour. The lens was transparent.

She was admitted to St. Mark's Ophthalmic Hospital the day after the accident, and in a fortnight was discharged. There was then no vascularity pain or tenderness in the injured eye. The hernia of the iris was flattened, and the wound in the sclerotic was healed. *Right eye* : V. = Fingers at 1'5m. The *Left eye* showed no sign of sympathetic implication, V. = $\frac{6}{80}$.

She was readmitted Nov. 16th, after having been at home for three weeks. Her mother stated that for the last week the Right eye had been red, and that for the past few days the Left eye also had been a little watery and weak. The Right (causing) eye was more vascular than when she left the hospital, and the Left (sympathising) eye showed some zonular vascularity and discolouration of the iris, but no synechia. There was no trace of keratitis punctata, nor was there either photophobia, pain, or tenderness in either eye. *Right* : V. = $\frac{4}{80}$. T—?. *Left* : V. good (but not actually recorded), Tn. The Ophthalmoscope showed the cornea and lens of the Left (sympathising) eye to be clear, but there was slight diffuse muddiness of the vitreous ; the disc was somewhat swollen, with blurred edges, and the veins were larger, darker, and more tortuous than in health. No choroiditis was recognisable.

The sympathetic inflammation soon rendered observation of the papilla impossible by reason of lenticular opacity. The cornea and lens capsule were covered with minute spots of opacity, and iritis with synechiæ posterior was also present."

Dr. William A. FitzGerald has informed me that he has seen a case in which optic neuritis was observed in the sympathising eye six weeks after the primary injury (a penetrating wound in the lower part of the cornea). There was, however, some keratitis punctata also present when the neuritis was first observed. How long the changes in the disc had been present cannot be stated,

but they must have been amongst the earliest to appear, for one week previously there were no external signs of sympathy whatever.

The fact that a very considerable amount of papillitis may exist without producing any loss of sight or other subjective symptoms would render it very possible for such a condition to be overlooked ; for not until some of the subjective or external symptoms of inflammation appeared would the patient present himself for examination, and the more obvious uveitis would then attract the attention of the surgeon. I would suggest that :—

1. It is probable that most cases of sympathetic inflammation are ushered in by a more or less marked papillitis.

2. That it is advisable in all cases where sympathetic inflammation is feared, to examine systematically, and at short intervals, the papilla of each eye, and to note its condition.

RETINITIS CAUSED BY A FLASH FROM A SUN REFLECTOR.

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The record of the following case is by no means as complete as one would wish ; it occurred many years since, but such as it is, it is published here now, as being of interest in connection with Deutschmann's cases and experiments, reviewed in the April number of the Review (p. 109).

On a bright hot summer's day in 1874 (?) a young girl, aged about twenty, was walking along one of the thoroughfares of Sheffield. She was in the enjoyment of perfect health. A boy passed along the street playing with a hand sun-reflector, and shone it directly on her, the light impinging on one eye. It appears only to have been a single flash. She felt the eye affected almost immediately, and very soon after, probably the next

day, she sought advice in consequence of serious impairment of vision. Everything appeared enveloped in a mist. With the ophthalmoscope was observed, in the neighbourhood of the optic discs and macula, veiling of the vessels and cloudiness of retina. Vision = J 20. The treatment consisted of small doses of perchloride of mercury and the use of coloured spectacles. In a short time the retinitis cleared up and perfect recovery took place, and as the patient some years later again came under my care, I am enabled to say that the result held good. After this space of time I am unable to say whether the effusion was greater in the neighbourhood of the macula than the optic disc; nor have I any evidence as to the presence or absence of a scotoma. Possibly there was some slight photophobia, but certainly no marked conjunctival congestion.

This case was in reality under the care of my esteemed friend Mr. Gillott, and it was owing to his courtesy that I was at different times enabled to examine it. In a letter returning me the notes of the case just given, Mr. Gillott makes the following remarks:—"I remember the case, one of retinitis from intense light. I remember just such a one in a young man from looking at the sun in the course of an eclipse."

TWO CASES OF CENTRAL AMBLYOPIA FROM EXPOSURE TO THE DIRECT RAYS OF THE SUN.

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Deutschmann's recent communication on this subject having been reviewed in the April number of this journal, I think the two following cases may be of interest. Although such cases are said to be frequent, yet very few have been recorded.

The points of interest in these two cases are:—

1. In respect of *Symptoms*.—The existence in each case of (*a*) a positive central scotoma, and (*b*) metamorphopsia, consisting in a peculiar bulging or enlargement

of a straight line at the point of fixation; and (*c*), in the first case only, the presence of a positive after-image, which still continued four months after the exposure. Neither *b* nor *c* was noted in any of Deutschmann's cases. Possibly *b* may be due to an approximation to each other of the retinal elements at the macula lutea as a result of the diseased process.

2. *Treatment*.—The apparent benefit from treatment in the first case.

3. The absence of any *Ophthalmoscopic Sign* in the first case.

Case 1. Mr. H., aged about 45, came to me on December 28th, 1882. He told me that on the 14th of the same month, the day before the Transit of Venus, he had been riding in an open vehicle in the country, when his coachman drew his attention to some peculiarity which he fancied he saw in the sun. The day was one of bright sunshine, and on six or seven different occasions he was induced to look at the sun, unprotected, with his right eye alone, for a few seconds each time. Since then he has noticed a black spot before the eye. When he closes the affected eye he sees a flickering light like the flame of a candle coming from the lower part of the field and passing upwards until it disappears out of sight above. He also says that the spot of any long straight line or object, such as a walking-stick, leg of a chair, telegraph-post, etc., upon which he fixes his gaze, becomes bulged or swelled out, but not otherwise distorted.

He is emmetropic, and his vision, which had been perfectly normal, is now $\frac{6}{18}$ in the right eye. With the correcting-glass for his presbyopia, he can read Snellen's smallest type with difficulty, owing to the black spot which comes just over the word he wishes to look at. In fact he reads with slightly eccentric fixation with this eye, looking directly at the word in advance of the one he wishes to see; yet examination in the usual way for central scotoma, either with the black board or perimeter, gave a negative result, and hence I conclude that the defect was extremely minute.

The ophthalmoscopic appearances of the fundus oculi was absolutely normal.

The treatment I employed consisted in hypodermic

injections of strychnia, and the continuous current locally applied. It could not, however, be strictly carried out, as the patient was unable to remain constantly in Dublin. On the 17th of January, 1883, twenty days after his first visit, V had improved to $\frac{6}{12}$ or $\frac{6}{9}$ (?), and he thinks the spot has become lighter. He then remained away until the 19th of April, 1883. He still has the flickering after-image when he shuts the eye, and the bulging at the fixation-point in a straight line. His V now is $\frac{6}{12}$ centrally, $\frac{6}{9}$ eccentrically—i.e., looking at one letter he recognises its next neighbour, or even a few letters of $\frac{6}{6}$. With a glass to correct his presbyopia he can read 0.5 Snellen fluently, but the letters look “spread,” or “enlarged.” Ophthalmoscopic appearances normal.

Case 2. R. P., aged 23, coachman to the former patient, and who was driving his carriage on the 14th of December, 1882. I had an opportunity of examining this patient on the 20th of April, 1883. He told me that in the course of the 14th of December he had *frequently* looked at the sun with his unprotected right eye, and thinks on one occasion he continued to do so for two or three minutes! He is emmetropic, and the vision of his right eye is now $\frac{6}{18}$ centrally. He does not think V is much improved since the occurrence. He has no after-image on closing the eye. On looking at a distant object for a time it becomes dim and blurred. If an ordinary walking-stick be held perpendicularly before his eye, at a distance of 4 m., any part of it he looks at seems to swell out to nearly three times its actual thickness, and the apparent node is about 10 cm. long. He complains of a positive central scotoma. He can read No. 1.25 Snellen with eccentric fixation, but not No. 1. A small central scotoma can be detected with the black board, its dimensions being about 6 mm., at a distance of 65 cm.

In the affected eye the ophthalmoscope reveals a dense red spot, very similar to, but decidedly larger than, the appearance found there normally, and much larger than the normal appearance in patient's left eye. The central whitish spot described by Deutschmann was not present, although it may have been so at an earlier period. In Deutschmann's cases 3 and 4 this whitish spot had quite disappeared within five months from the exposure.

TH. LEBER (Göttingen). On Cataract and other Eye-affections caused by Lightning. *Von Graefe's Archiv.*, XXVIII., 3., p. 255.

Leber records a case, examined by himself, of permanent injury of the eyes and other parts of the body by a lightning-stroke, and gives a complete analysis of all that is at present known of ocular injuries of this kind.

A ship's-captain, aged 31, was struck by lightning while at the helm, and fell unconscious. Consciousness returned after two hours, and he found himself paralysed, partially, in arms and legs. The face, especially on the left side, was extremely burnt; also the left side of neck and chest, and the left hip. The left eyelids were much swollen and could not be opened: the right eyelids less so, and the vision of this eye was impaired. A few weeks later, when the left eye could be opened, the vision of this was found to be more impaired than that of the right. Under treatment in a Hospital the external injuries healed; the patient was told that the lens of the left eye was damaged by the lightning, and would require extraction after a while; this eye also probably had paralysis of the accommodation. At first vision improved somewhat, but later on it gradually deteriorated in both eyes until the left was practically blind. The paralysis of the limbs slowly improved.

The patient came to the Göttingen clinic four years after the accident. He had at that time in the right eye, posterior cortical cataract without other visible defect; in the left eye, mature cataract with perception of light, but uncertain projection; also considerable impairment of power in lower limbs, but no complete paralysis. The mature cataract was extracted. The optic disc was then found to be white, acuity impaired, and the field greatly contracted, the temporal half being quite wanting, the nasal much reduced.

In the foregoing case the eyes suffered three kinds of disturbance, distinctly caused by the action of lightning, namely, double cataract, worst on the left side, the side which was directly struck; left sided partial atrophy of the optic nerve; and left sided mydriasis and paresis of accommodation.

The author refers to five other cases of the production of cataract by lightning, in several of which the evidence as to causation is complete; thus the subjects were young persons,

whose vision was good before the accident, impaired immediately after it, and no other cause was discoverable. In three of the six cases the cataract was in one eye only; in the other three it was in both. In two cases a peculiarity in the form of the cataract was noted; thus in Leber's case the opacity affected the posterior cortex, and especially a ring round the posterior pole, and in another the anterior pole was chiefly affected. In no case was a diminution of the lental opacity observed; the progress resembled that of ordinary traumatic cataract.

The other ocular lesions which lightning has been known to produce are rupture of the choroid, hæmorrhage from choroid and retina, and partial detachment of the retina. The occurrence of these deep-seated lesions without rupture of the external tissue, recalls to mind the fact that similar injuries have been witnessed as the result of the passage of a projectile close in front of the eye. As regards the permanent atrophy of the disc in Leber's case there was no evidence as to its precise nature, whether primary from injury to the nerve itself, or secondary to retinal charges.

In addition to the foregoing, instances of *transient* loss of sight from the same cause are on record. In most of these the affection was bilateral, but not in all; in some blindness was complete, in others light-perception was retained; complete restoration of sight sometimes occurred in the course of a few days, while in other cases improvement was more tardy, and a permanent reduction of vision with contraction of the visual field remained. During progress towards recovery an over-sensitiveness to light was observed in several instances. A case is recorded by Von Graefe in which this hyperæsthesia was present, together with concentric limitation of the field in the one eye, and facial spasm on the same side; but Leber thinks it uncertain whether these disturbances were due directly to the action of the lightning or to the fright which it caused. In addition to the purely ocular lesions there were in some cases paralysis of the ocular muscles, and, in Leber's case, hemiparesis.

These various disturbances must certainly be regarded as immediate consequences, in almost every case, of the electrical explosion. In what manner does the electricity act? In the older text-books the intense light is assumed to be the chief agent; but this idea is untenable, for not only are the intensity

and the duration insufficient, but a lesion so produced would at most amount to a scotoma of limited extent instead of affecting the entire field ; moreover, the accident has been known to happen during sleep, when, the eyelids being closed, the effect of the light would be insignificant ; and again it is impossible to ascribe to the action of light the associated nerve lesions or the obvious structural changes in the choroid and lens. Czerny has demonstrated that the direct rays of the sun condensed by a lens, will produce an opacity in the crystalline lens in about a quarter of a minute by coagulation of albumen, but this affords no explanation of the production of cataract by lightning, for the most brilliant lightning-flash is far less intense than concentrated sunlight, and its duration is much less than a quarter of a minute. With regard to retinal changes also, it is not yet by any means established that simple dazzling by bright light can produce a progressive diffuse retinitis.

In several cases it is clear that the lightning actually struck the patient, but in others the absence of any burn or other external injury proved that it did not do so. Hence, as in the somewhat analogous case of closely-passing projectiles, it is certain that the lightning may inflict injury not only on structures lying directly in its path, but on those to which it passes near ; an intense electrical disturbance is set up in the neighbourhood of its track, which acts upon the tissues in the same way as a violent mechanical disturbance, and may cause such lesions as rupture of the choroid or detachment of the retina.

The formation of cataract might be attributed to rupture of the lens-capsule, but no sign of such rupture has ever been detected, and the fact of both lenses suffering is opposed to such an explanation. On this ground Leber abandons the idea of any mechanical production of the opacity, and would attribute it to a "direct physico-chemical action" of the electricity on the lens substance, by which its albumen is coagulated. Such coagulation can hardly be ascribed to heat alone, for experiment shows that a higher and more enduring degree of heat would be required than can reach the lens during the lightning-flash ; moreover the eyes in which cataract was produced presented no external sign of scorching ; it must, therefore, be regarded as a result of a kind of catalytic action, and may be compared with the curdling of milk which occurs during thunder storms.

This effect, Leber suggests, is probably not confined to the lens, but would probably be discoverable as an opacity in many other structures were these latter transparent. The non-vascularity of the lens, as compared with the vascularity of other tissues, may explain the permanence of the lesion in the one case, and its gradual disappearance in the other.

Without disputing the reasonableness of this hypothesis of catalytic action, it may, we think, be asked whether it is necessary to discard the idea of mechanical injury in the case of the lens simply because the capsule remains unruptured. If the shock can in one case rupture the choroid or detach the retina, may it not in another so disturb the lens within its capsule as to cause some slight separation of the fibre-layers, which, once started, may lead on to complete degeneration?

WM. A. FITZGERALD (Dublin). *The Theory of a Central Lesion in Exophthalmic Goitre.* *Dublin Journal of Med. Science*, March and April, 1883.

FitzGerald argues for the central nature of the lesion in Graves' disease, and seems to accept almost unreservedly the theories advanced by Sattler in the Graefe-Saemisch Handbook, vol. vi., and by W. Filehne. In the first part of his paper he examines the various theories of the disease, and shows that it is impossible to explain its several phenomena by the assumption of a lesion of the sympathetic; in the latter part he endeavours to explain the remarkable preponderance of the symptoms on the right side of the body. The suggestions as to this point are new, and, whether they be generally adopted or not, are at any rate ingenious and interesting.

The theory of the disease which has been most commonly accepted, is that of a lesion of the cervical sympathetic, the goitre and exophthalmos being ascribed to dilatation of the vessels, caused by paralysis of the vaso-motor nerves, and the cardiac symptoms and eyelid phenomena (Graefe's and Stellwag's signs) to a state of permanent irritation of the excito-motor fibres for the heart, and of the sympathetic nerves which supply the palpebral muscles of Müller. The difficulty arises here, that whereas some of the symptoms are referred to paralysis, others are attributed to a state of nerve-irritation. Moreover,

it is difficult to believe in the existence of such an extreme and persistent condition of nerve-irritation as would be necessary to account for the cardiac symptoms; and, again, neither goitre nor exophthalmos have ever been produced experimentally by section of the cervical sympathetic. The absence of any affection of the pupils is another difficulty, so that altogether the theory of disease of the cervical sympathetic seems untenable.

The principal symptoms of Exophthalmic Goitre can all be accounted for by the assumption of paralysis of certain centres—of the vaso-motor centre for certain portions of the head and neck; of the cardio-inhibitory centre of the vagus; and of the centres for certain associated movements and reflex actions in connection with the eyelids. Filehne has succeeded in producing the principal features of the disease in rabbits by wounding the restiform bodies, and Brown-Séquard had previously induced exophthalmos in guinea-pigs by means of a lesion of the same portion of the medulla oblongata. This last-named physiologist also produced Othœmatoma, or sanguineous tumour of the ears, by wounding the restiform bodies near the nib of the calamus scriptorius.

The author suggests that, as Graves' disease is of tolerably frequent occurrence among lunatics, to which class of persons this affection of the ear is almost entirely confined, it is not unlikely that patients may be found suffering from both diseases. He quotes one or two such cases, and suggests further inquiry in this direction.

The occurrence of what are undoubtedly central affections in cases of exophthalmic goitre seems to strengthen the central theory. Such are paralysis of the associated movements of the eyes, ophthalmoplegia externa, and various other nervous symptoms. The complication of Graves' disease with glycosuria, which has been occasionally noticed, seems to point in the same direction, and several post mortems are on record, in which central lesions have been found. The fact that a few post mortems have shown alterations of the cervical sympathetic will, no doubt, be quoted in support of the opposite theory; in a still larger number of cases, however, careful microscopical examination has failed to detect any abnormality in the cervical cord or its ganglia.

The preponderance of the symptoms on the right side of the body is universally admitted. The right lobe of the thyroid is usually larger than the left, and if there be any difference in the degree of exophthalmos it is almost always more marked on the right side. Among seven recorded cases where but one lobe of the thyroid was enlarged, in all it was the right which was thus affected, and of the cases in which the exophthalmos was unilateral, either through the entire course of the disease or for a considerable period, in fifteen it was the right eye, and in five the left which was involved, while in two cases it was not noted which eye protruded. Fitzgerald suggests that the explanation of this preponderance of symptoms on the right side is to be found in the extreme constancy of the cardiac affection. This latter is by far the most constant feature of the disease, being very rarely absent, and generally preceding the other phenomena. Now if it could be shown that the cardiac affection, so rarely absent and so generally present at the very first, was itself a right-sided symptom, it would go far towards explaining the matter. This would seem actually to be the case, for it appears more than probable that it is the right pneumogastric which chiefly inhibits the heart, and that the left has very little power in that way. This has been proved for various animals by Arloing and Tripier, Masoin, and Meyer, and at least three cases are on record in which, in human beings, irritation of the *right* vagus caused marked cardiac inhibition.

The explanation of this remarkable fact of the right vagus chiefly supplying the cardiac nerves is in all probability afforded, as the author points out, by the mode of development of the heart. This organ first makes its appearance as an elongated vertical sac, or tube, lying on the ventral surface of the embryo in front of the throat. It is at first symmetrically situated, but soon becomes bent on itself like a horse-shoe and *projects towards the right side*. That the pneumogastric nerves are developed at an early period is shown by the recurrent direction of their inferior laryngeal branches, which proves that they must have been formed before the descent of the heart from the neck into the thorax, and as, at that early period, the heart is situated to the right of the middle line it is not surprising that it should be chiefly supplied by the right vagus.

If there be anything in this suggestion one would expect to find that, in a considerable proportion of those very rare cases in which cardiac symptoms are absent, the other symptoms should preponderate on the left side, and investigation shows that this is so. The writer analyses the published cases in reference to this point, and shows that the majority of them are in accordance with his theory. Space will permit of only one or two being quoted here. Thus Reith has recorded a case in which *left* exophthalmos had been noticed for years, but the right eye protruded only one day before the patients' death, which occurred with cerebral symptoms. Post-mortem examination showed slight enlargement of the thyroid (not noticed during life), and changes in the cervical sympathetic, especially on the left side. There was no history whatever of palpitation. In a remarkable case recorded by Yeo, *left* exophthalmos had been present for about twenty-one months, and palpitation for about three months, before the case came under observation, and there was enlargement of the *right* lobe of the thyroid which had not been noticed by the patient until her attention was called to it. It must at this time, therefore, have been slight, although it subsequently became most marked. It thus appears that *left* exophthalmos had existed about eighteen months before palpitation and *right-sided* goitre came on together. At a later period the right eye also became prominent, and the left lobe of the thyroid was enlarged.

It is to be hoped that the vexed question of the pathology of Graves' disease, which has given rise to so much discussion and called forth so much argument, may soon be settled by means of definite post-mortem observations. With this object in view it is exceedingly desirable that careful microscopical examinations of the brain and spinal cord should be made in fatal cases of the disease, and that particular attention should be directed to the condition of the medulla oblongata.

E. G. LORING (New York). *Premature Delivery for the Prevention of Blindness.* *New York Med. Jour.*, Jan. 20, 1883, p. 59.

It is well known that pregnant women occasionally suffer, especially towards the end of gestation, from a disturbance of vision of more or less gravity, and that although great improve-

ment and even complete restoration may follow parturition on the first occasion, the failure of vision is likely to recur in each succeeding pregnancy, and may lead to permanent blindness. The explanation of this symptom, in most cases at least, is that the pregnant condition induces albuminuric, or aggravates it if already present, and albuminuric retinitis follows; uræmic amaurosis may be superadded at, or shortly before, the time of labour. Förster expresses doubt (Graefe and Saemisch, vol. vii., p. 102) whether the amblyopia of pregnancy ever occurs independently of albuminuria. Loring's case referred to below proves, however, that it does so.

Loring cites two cases, one observed by Bowman, the other by Lawson, which illustrate the disastrous results which may come from allowing pregnancy to proceed to the full term in presence of this complication; in both, vision was permanently injured, and in one there was nearly complete blindness. Many such observations have been recorded. He also cites cases in which, together with the ocular lesion, there was severe constitutional disturbance, threatening or actually leading on to puerperal convulsions, and in which the induction of premature labour for the relief of the general symptoms led simultaneously to the subsidence of the ocular trouble.

Looking at the serious evils which follow non-intervention on the one hand, and the favourable results which are known to have followed an early termination of pregnancy on the other, Loring urges that there are cases in which it is not only justifiable but imperative to induce premature labour for the purpose of preventing blindness. It may be objected that such interference would be opposed both to morality and to law. With regard to the former the question is whether the *possible* life of a sickly child ought to outweigh the probable loss of sight in the mother; whether it is right that the highest and most useful of the senses should be sacrificed rather than the workings of nature interfered with. The law states that premature delivery shall not be performed except for the preservation of the life of the mother or the child; but it may be asserted that in operating to save the sight we are operating to save the life. The visual failure is one of the group of symptoms which declares the liability to puerperal convulsions, and, as Graefe said, the prognosis for life is worse even than that for sight.

Given a pregnant woman with loss of vision or organic lesion of the retina or optic nerve as the prominent or even as the sole symptom, no one can say that a series of convulsions may not set in which will destroy not only the life of the child, but that of the mother also.

A married woman, aged 35, consulted the author for failing sight. She had been married about eight years, and confined thrice. Two weeks before the first confinement the left eye failed rather suddenly, a portion of the outer half of the field being lost. Improvement was noticed when the menses reappeared after delivery. Just before the second confinement the same eye failed again and to a more serious extent, and remained permanently useless. Just before the third confinement precisely the same thing occurred in the right eye as had previously taken place in the left. On examination three months after the confinement the left eye had only perception of light in a small part of the inner half of the field; the right eye could barely count fingers at a few feet, the outer half of the field was chiefly affected; thus, in each eye, the nasal portion of the retina had suffered most. The condition of kidneys, heart, and lungs was repeatedly examined; no trace of albumen was ever found, and nothing abnormal was discovered in any organ. Strychnia injections, mercurials, iodides, and tonics were tried for a month, but vision was not improved. Then the menses reappeared, and at the end of another month vision had improved greatly, $V = \frac{1}{3}$; the field remained imperfect. The patient was warned of the danger which would attend another pregnancy. Eighteen months later she returned in alarm for the future, being again pregnant nearly three months; vision had improved a little since the last examination. In consultation with the family physician, and with the object of preventing the imminent danger of blindness, premature delivery was decided on, and performed when the foetus was three months old. Considerable reaction followed, and the patient remained in delicate health for some months, but vision failed no further, and six months after the operation was found to have risen to $\frac{1}{2}$ or a little better.

Loring states that this is the first case on record of premature delivery where the most prominent if not the sole symptom was a loss of vision; it is not, he thinks, the first in

which it ought to have been done. Since its publication Dr. Moore of New York has advised the same proceeding in a case of albuminuric retinitis : at the time of operation (eighth month) examination showed $V = \frac{1}{40}$, and perception of light, in the two eyes respectively ; after expulsion of the fetus V rose rapidly to $\frac{2}{3}$ and $\frac{2}{7}$.

In conclusion, the author urges that when a loss of vision, either temporary or permanent, has once resulted from gestation, it is the duty of the medical adviser to explain, both to the wife and the husband, that the cause of the trouble is a constitutional and not a local one, and that there is every probability of recurrence of the trouble in succeeding pregnancies which may lead, not only to the destruction of vision, but even to loss of life.

J. HIRSCHBERG (Berlin). Amaurosis after Hæmorrhage.
Zeitschr. f. klin. Med., Vol. iv., Nos. 1 and 2.

The author repeats the description given by him in 1877 of the ophthalmoscopic appearances in a case of amaurosis after violent hæmatemesis, and now adds the results of the post-mortem examination of the optic nerve and retina. This is the first case of the kind which has been submitted to microscopical examination.

The patient was a man, aged 52. The eyes were examined on the third day after the loss of blood ; the patient was at the time extremely anæmic, had a thread-like pulse, and was unable to raise himself without assistance. Both eyes read ordinary type with difficulty when aided by a convex lens of six inches focus. The left papilla was whitish and hazy, and the arteries were small. In the right eye there was undoubted optic neuritis.

It was not till five days after the hæmorrhage that the patient complained of dimness of sight, and then it was in the right eye. Three days later ophthalmoscopic examination revealed in the *right eye* extensive neuro-retinitis, obscuration of the disc margin and of portions of the vessels, a white haze extending all round the disc and across the macula, and innumerable recent hæmorrhages— $V. = \frac{1}{20}$; in the *left eye* the appearances of commencing neuro-retinitis, enlarged tortuous veins, haziness of a portion of the disc and its neighbourhood, and two white spots in the retina near the macula ; $V. = \frac{1}{6}$.

Ten days after the hæmorrhage the *right eye* was blind, while the *left* still possessed $V. = \frac{1}{8}$. The inflammation had increased slightly in the right, and considerably in the left. It then began to diminish, and by the 14th day the right papilla was brilliantly white and opaque, and the left papilla was recovering its clearness.

On the 36th day the *right eye* was blind, with atrophied papilla and narrow arteries; the *left* had $V. = \frac{1}{2}$, with almost normal fundus.

Three-and-a-half years later a fresh attack of hæmatemesis, and melæna carried the patient off. An ulcerated carcinoma was found in the stomach; the optic nerves and retinæ were examined microscopically with the following results:—*Right nerve*, no traces of axis cylinders, nerve tissue completely replaced by dense connective tissue rich in nuclei, the external sheath not noticeably thickened, and the intervaginal space empty. In the right papilla there were signs of past inflammation, and in the retina the nerve fibre layer had completely disappeared. *Left nerve*, normal except for a circumscribed peripheral atrophy occupying about one-third of its circumference and one-eighth of its diameter, and becoming rather larger near the globe. The left papilla atrophic on one side, and the nerve fibre and ganglionic layers of the retina rich in nuclei.

Hirschberg draws attention to the absence of any intravaginal hæmorrhage in this case; of course it is impossible to affirm that there was no œdema of the nerve sheath at the time when the blindness occurred.

J. HIRSCHBERG (Berlin). On the Refraction and Ophthalmoscopy of the Eyes of Fishes and Amphibians. *Archiv. f. Anat. and Physiol.*, 1882, p. 493.

Hirschberg has examined the eyes of living fishes and frogs with the ophthalmoscope, and has investigated the corneal curvature by means of his keratoscope, a target-like disc consisting of concentric black and white rings, and having a central aperture. The refraction was estimated by the direct method, and also, in myopic eyes, by ascertaining the greatest distance at which the inverted aerial image could be distinctly

seen; the distance of the observer's far-point being subtracted from this gave the far-point of the eye examined. By an ingenious arrangement he also ascertained the refraction of the eye when immersed in water; a cover-glass, such as is used for microscopical preparations, was placed on the cornea, on which some water had been previously dropped. The conclusions arrived at are quite opposed to those of Plateau, who published a monograph on the subject in 1866 (see Acad. Royale de Belgique, Extr. du Tome XXIII., des Mémoires couronnés), and whose views seem to have been accepted by Leuckart in his article "Organologie des Auges" in Graefe-Saemisch, vol. ii., 1876.

It is well known that the eyes of animals living in water are distinguished from those of animals living in air by a lesser curvature of the cornea, and a greater convexity of the lens. A convex cornea would be of little service to the former, as the aqueous humour inside the eye differs but slightly in refracting power from the water outside it. Plateau, who appears not to have availed himself of the ophthalmoscopic examination of living eyes, believed that the central portion of the cornea in fishes and amphibians is quite flat, and "that in consequence of this conformation and of the globular shape of the lens, they can see equally well in air and in water; only the distance of distinct vision is a little greater in the latter medium." Leuckart agrees with this, but, by what is evidently an oversight, makes the distance greater in air.

Hirschberg finds, however, that in fishes the cornea has a very irregular curvature; in air it produces marked astigmatism, and regarded as a refracting medium is of most imperfect construction; but in water it has little or no refracting power, and the astigmatism disappears. He finds that the frog's cornea, on the other hand, possesses as regular a curvature as that of man.

The refraction in fishes is, according to Hirschberg, slightly myopic in water, and highly so in air; thus in the pike it is $M=1.15$ D in water, and $M=16.0$ D in air. Plateau puts the pike's far-point in water at $1\frac{1}{2}$ or 2 inches, but it seems hardly possible that, with such defective vision, the pike family could have survived so long in the struggle for existence.

The refraction of the frog's eye in air, estimated by the direct method, and focussing for the nerve-fibre layer of the retina at the lower edge of the papilla, is hypermetropic to the extent of from 5.0 D to 7.50 D. But the retina of the frog is relatively much thicker than that of man, considering the length of the optical axes, and the percipient layer is therefore not hypermetropic but myopic. The frog's far-point in air is, according to Hirschberg, at from 5 to 8 inches ($M=8.0 D$ to 5.0 D). Plateau estimated it at $1\frac{1}{2}$ inches. In water the refraction becomes highly hypermetropic, probably to the extent of 16.0 D or more.

There appears to be no evidence of accommodative power in either frogs or fishes.

The following comparisons may be instituted:—The eyeball of the frog is almost globular, that of the fish (pike) transversely oval. The frog's cornea is regularly curved, the radius of curvature being about half the optical axis; that of the fish is irregularly curved, the radius being (approximately) rather more than twice the length of the optical axis. The refraction of the frog's eye (anterior surface of retina) in air is hypermetropic, that of the fish is very highly myopic.

Sketches of the fundus of the pike, eel, frog, etc., are given by the author, and in an appendix is an elementary description of the dioptrics of globular lenses.

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THREE CASES OF EXOPHTHALMIC GOITRE.

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In connection with Dr. William Fitzgerald's paper on Exophthalmic Goitre (*vide* O. R., vol. ii., 148) the following cases may be of interest. The first case presents a complication which is, I believe, unique, and the other two are worth record from the fact that the patients are sisters. The latter are perfectly typical cases of the disease, and as such tend strongly to confirm Fitzgerald's conclusions in the paper referred to, while the first—in its variations from the common type—exhibits points which argue no less strongly in favour of the same conclusions. All three patients are females, and the eyes of two of them are extremely myopic.

CASE I.: An unmarried lady, aged 35, consulted me in October, 1880. She had five years previously been with the late Dr. Wilson, whose brief note of the case I have the good fortune to possess. He found slight exophthalmos, enlargement of the lateral lobes of the thyroid, and great pulsation and bruit in the neck. He also notes an atrophic appearance of the discs, and commencing opacity in the cortex of the lenses. Unfortunately his notes contain no further information except that he prescribed digitalis.

The history the patient gave me was that her eyes had always been weak, but that some two years previously, after an attack of diphtheria and an accidental fracture of one of her arms, her sight became so bad that she could not read, and she consulted an oculist, whose prognosis was so unfavourable that she kept out of the way of the medical profession entirely for the space of two years and upwards. She thought that her

eyes first became weak in 1870, at the age of 25, after an attack of mumps and some severe family troubles; but palpitation, to her knowledge, first occurred in October, 1880, five years after Mr. Wilson had observed the exophthalmos and the pulsation in the neck. She did not know when her throat began to swell. It had been unusually large ever since she had bought her own collars. She thought the left side was the first to begin to swell.

On examination I found very evident proptosis and marked enlargement of both lateral lobes of the thyroid, apparently symmetrical, but the blood vessels on the left side were extremely tortuous, a condition not observable in the right side. There was visible pulsation, and a bruit audible with the stethoscope. I have no note of the pulse on this occasion, but on subsequent visits it was 140 and 120 respectively; on the last occasion being 100.

Right Eye, M-1 D, V = $\frac{5}{30}$ } + 2.5 D, Wecker, No. 5.
Left Eye, M-1 D, V = $\frac{5}{30}$ }

With the ophthalmoscope distinct atrophy of both papillæ was visible. There was well-marked thickening of the coats of all the blood-vessels,—both arteries and veins,—and their size was reduced. The edges of the discs were somewhat irregular, and their surfaces had a filled-in appearance, so that the laminæ cribrosæ could not be seen. The colour of the discs was a sort of pinkish grey—not a pure grey. There were a few atrophic patches scattered about the fundus, especially marked in the neighbourhood of the maculæ, which I at the time considered to be situated in the chorioidea, and there were also visible in the retina a few small glittering white spots of great brilliancy, which I took to be either points of fatty degeneration of the retina or actual crystals of cholesterine. I also noticed the opacity in the lenses formerly observed by Mr. Wilson.

The condition of the fundus distracted my attention from the other points of the case, for I find no mention of any other facts in my notes taken on this occasion. On a subsequent visit I noticed pigment lying in some of the retinal blood vessels, and I noted that neither Graefe's nor Stellwag's signs were present.

I had the opportunity of seeing the lady a few days ago, and found to my surprise that all appearance of exophthalmos

had completely disappeared, although the condition of the thyroid, heart, and eyes, was in other respects unaltered. Vision, indeed, had very slightly deteriorated in the two years' interval. She had a severe attack of swelling of the throat and palpitations last summer after the death of a near relative. Neither Graefe's nor Stellwag's sign was to be seen.

The chief point of interest in this case is undoubtedly the condition of the optic nerves. From their appearance there can be no doubt but that at some period, most probably at the time the patient broke her arm, when the sight became so suddenly worse, she had an attack of optic neuritis. I do not believe that the loss of the power of reading then first noticed could have been due to the ordinary paralysis of the ciliary muscle that occurs after diphtheria, for the power of reading never returned, and when I saw her there was no paralysis of the ciliary muscle demonstrable. The dull-grey filled-in aspect of the discs, and the unevenness of their outlines, point decidedly to antecedent neuritis, and this view is rendered more probable by the marked perivascular exudations in both eyes.

It cannot, however, now be determined whether this neuritis was merely a local affection or the external manifestation of some cerebral lesion which determined its occurrence. The evidence for the presence of double optic neuritis as it occurs in cerebral disease,—the *stauing's-papilla* of the Germans,—is not conclusive in this case. I have seen discs in cases of chorioidal disease and of retinitis pigmentosa which did not differ in any visible respect from the discs in this case, and the occurrence of the patches of chorioidal atrophy, and the pigment seen on some of the retinal vessels are both arguments rather against the theory of a double papillitis from a cerebral cause.

Although I cannot bring this case forward as an additional argument in favour of the theory of a central origin for exophthalmic goitre it is yet extremely in-

teresting ; for a neuritis, or if the term be preferred, a neuroretinitis, undoubtedly took place, and such an occurrence so far as I know has not yet been observed in this affection.

This case is also worth record from the unusual course of the disease. As is well known, it is most usual to have the cardiac symptoms earliest developed, and to have the goitre and exophthalmos more pronounced on the right than on the left side ; my two other cases illustrate the typical course of the affection in these respects. In this case, however, the exophthalmos and goitre were noticed at least five years before the patient complained of any palpitation, and though there seems to have been no difference in the proptosis on the two sides the goitre was certainly more marked on the left side, for we have this extreme tortuosity of the vessels on that side to confirm the patient's own statements on the question.

CASE II. : An unmarried woman, aged 28, consulted me at St. Mark's Ophthalmic Hospital in the spring of 1882. Her history was as follows :—Some twelve years ago, when at business in a confectioner's shop, she got a sudden beating of her heart, so bad that she was actually sick. There were no other symptoms at this time. Shortly afterwards she got a fright from seeing a man in an epileptic fit, and she remained for a long time in constant dread of seeing a similar occurrence, and every morning used to be sick with a "sort of water brash." Her eyes were always short-sighted, but during this period of her life they began, whether suddenly or gradually she cannot say, to protrude, the right eye being much the more protruded of the two, and both being much more prominent than at the present time. For two years closing her eyes at night used to cause her intense pain, and she used to shake all over so that she had no power in her hands and legs. This tremor, indeed, was still observable when I examined her, but only to a very slight degree. The late Dr. Stokes prescribed for her, and she got somewhat better. It was only during the past six years that she noticed any swelling of her throat, at

first on the right side, then on the left, and latterly in the middle as well.

On examining her I did not find any differences in the exophthalmos in the two sides, although she herself thought the right eye was still a little more prominent. The exophthalmos was well marked, as was also the goitre, but I could detect no greater enlargement on one side than on the other. There was visible pulsation in the neck, and a loud bruit. Pulse 100. Pulsation of radials visible. Heart, so far as my examination went, sound. She stated that quite lately she had attacks of dyspnœa, presumably from the pressure of the goitre.

The ocular movements were restricted in all directions—owing partly to the size of the globes. Graefe's sign was present, the upper lid not following the eyeball in looking downwards to the usual extent. Winking was infrequent, but Stellwag's sign of retraction of the lids was absent.

The pupils were wide and sluggish.

Right Eye, M — 15 D, V = $\frac{5}{20}$? Wecker No. 7.

Left Eye, M — 14 D, V = $\frac{5}{20}$ Wecker No. 1.

On the very centre of the anterior lens capsule of the right eye there was a circular patch of minute brown spots, but the media were otherwise normal on both sides.

In both eyes there were immense posterior staphylomata, in the left completely surrounding the disc, and in the right extending towards the temporal side to a distance greater than the diameter of this disc. The chorioidal pigment was generally rather atrophic, and the region of the macula of the right eye contained a mass of pigment.

This patient has been under my care for about a year, during which period she has had attacks of dyspnœa, and her pulse has varied from 120 to 80. I have given ergot, arsenic, digitalis, and belladonna at different times, but what has been of most use to her has been a mixture of the citrate of iron and quinine and belladonna.

CASE III. : Mrs. N., aged 35, sister of the last patient, was brought to me by her sister in February, 1883. She had been ten years married, and had had five children and two miscarriages. Her sight was always short, but it was good till four years ago when nursing one of her children. She then got an

attack of "inflammation in the right eye, and general nervousness," her heart being bad with palpitation, so that she could hardly lie down in bed with it. Two years later she noticed her throat. She has still a "a nasty nervous affection" of it, which she calls "bronchitis," and describes as "a sort of closing up of the throat." The right side of her throat was the first to enlarge, and has always been the biggest. The right eye was the first to protrude, and has always been most prominent.

On examining her I found both lobes of the thyroid enlarged, the right more than the left, but neither very much swollen; slight visible pulsation in neck; pulse 80. Marked proptosis on both sides, but much more marked on the right. Graefe's and Stellwag's signs present on both sides, but not more marked on one than on the other. Winking infrequent and slow on both sides. Both pupils small and active.

Right eye, M — 11 D, V = $\frac{5}{40}$ or $\frac{5}{30}$?

Left eye, M — 6 D, V = $\frac{5}{20}$? I found, however, on examining by the erect image a myopia of at least 10 D on this side.

In both eyes commencing cortical cataracts, similar to those in Case I., and large posterior staphylomata completely surrounding the discs on all sides, apparently progressive. On her forehead there was a symmetrical patch of a brownish colour, forming an irregular Gothic arch with its apex at the top of her forehead in the middle line, and its bases at the temples.

Addisonian discolouration of the skin, I find, has been observed before in cases of ophthalmic goitre. Sattler refers to three cases, one of Friedreichs, and two of Chrostes. The discolouration occurred in them during the course of the disease, and persisted for some time after the other symptoms had abated.

The occurrence of exophthalmic goitre in two members of the same family, though exceedingly rare, is by no means unknown. Sattler, in treating the subject of hereditary influence, mentions only six instances as being on record. Three similar to mine, when the disease occurred in two sisters; two cases of a mother and son

being both affected ; and one when an aunt and three of her nieces (two of whom again were sisters), all suffered from Graves' disease.

If Fitzgerald's theory that the cardiac symptoms are to be regarded as right-sided is correct, we should expect that they should be well marked in the vast majority of cases, as it is generally acknowledged that the other symptoms are more marked on the right side than on the left in ordinary cases of the disease. It will be observed that Cases II. and III. are typical in this respect, and consequently tend to support Fitzgerald's views.

It is of course still more important for the substantiation of this theory that there should be exclusively, or at least more pronouncedly left-sided symptoms in those exceptional cases where cardiac palpitations are absent or only occur late in the course of the disease. Now although in my first case palpitations did occur, they certainly occurred very late, five years at least, after the other symptoms were present, and it is remarkable that this is the only case of the three that instead of exhibiting distinct right-sided exophthalmos and goitre, had a presumably symmetrical exophthalmos, and a goitre which was undoubtedly more marked on the left side.

AMAUROSIS FROM TUMOUR IN THE NASAL CAVITY: CURED BY REMOVAL OF THE TUMOUR.

BY PRIESTLEY SMITH.

The salient points in the following case are that a morbid growth in the nasal cavity caused impairment of sight in both eyes, unaccompanied for a long while by any visible changes in the optic discs, and that removal of the growth was followed by complete and permanent restoration of sight in one eye. It will be seen that the facts of the case rest to some extent upon the patient's statements only, but these were made with so much

clearness, and accord so well with the conditions actually observed that they may, I think, be taken as quite trustworthy.

Ellen W., a married woman, aged 25, came to the Queen's Hospital Eye-Department on *June 1st*, 1875, complaining of blindness of the left eye. The history of the case, obtained in detail at a subsequent visit, was as follows. She had begun to feel "a tightness in the nostrils," with pain in the forehead, during the autumn of the previous year; when she went out of doors she always used to cover her nose and mouth with a shawl, for if she neglected to do so the cold air brought on severe pain. One evening in *November*, 1874, the sight of both eyes went so dim that she could not see the clock; next morning the right eye was clear again, but the left remained very dim.

For this dimness she was treated for some weeks by an ophthalmic specialist; blisters were applied to the neck and temple; no improvement in sight was gained, and by *March*, 1875, or perhaps rather sooner, the left eye was totally blind. At this time there was a very offensive yellow and sometimes bloody discharge from the left nostril. It used to come away in large lumps. There was pain in the forehead, and this was always better when the discharge came away from the nose.

At the beginning of *May*, 1875, the right eye, which, excepting the first temporary attack, had hitherto remained clear, went dim, and in five or six days became so bad that the patient had to be led about by the hand; at the same time the pain became very severe in the forehead, temples, and nose. She went to the General Hospital, and came under the care of Mr. Bartleet. She was led to the Hospital, being quite unable to see her way. She could not see the surgeons, but knows that an instrument of some kind was passed into the left nostril, and that a discharge came away; clouds seemed to be rolling before the eye, and immediately afterwards she saw the bowl full of blood and matter, and all the things in the room quite clearly. The pain in the head was much relieved. A few weeks later (*June 1st*) she applied to me to know whether anything could be done towards restoring the sight of the blind left eye.

Fig 31 p 127

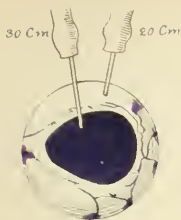


Fig 32 p 126

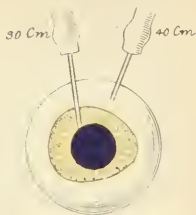


Fig. 33 p 147

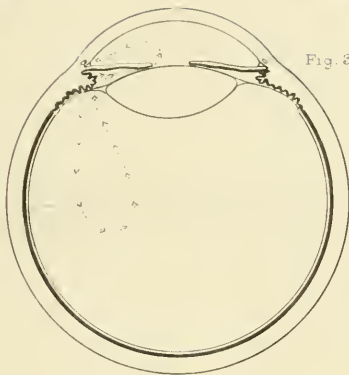


Fig. 34 p. 158.

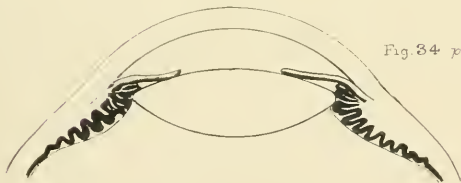
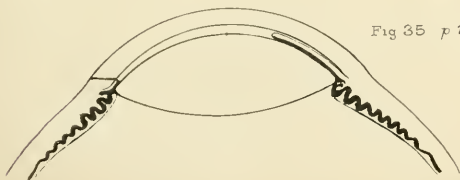


Fig 35 p 169.



June 1st, 1875.—*Right Eye:* $H=\frac{1}{40}$, $V=\frac{20}{30}$; field of vision, roughly tested, entire; colours readily distinguished (pale shades not tried); disc and vessels quite normal.

Left Eye: $V=0$; disc and vessels apparently quite healthy, not noticeably different from other eye. The facts concerning the discharge from the nose were not mentioned by the patient, and were not discovered at this first visit.

September 14th, 1875.—Patient complains that she has had several attacks of blindness of the right eye during the last week; they seem to come on if she is “excited or worried;” darkness comes on quite suddenly, perhaps in a second; it seems to come from the right side; there is no warning; it lasts perhaps for a quarter of a minute, and then the sight comes back, from the right side she thinks; with each attack there is pain in the right temple and forehead, and this lasts sometimes a day or two afterwards; there is no giddiness, vomiting, sleepiness, or loss of consciousness at the time or afterwards. Ordered bromide of potassium, 15 grains, three times a day, after communication with Mr. Bartleet, under whose care the patient continues. A fortnight later the patient reported only one attack of dimness since taking the medicine; “things look clearer than they did; there is not the nasty black wavering that there was.”

December 14th, 1875.—Has continued the bromide. Never has the sudden attacks of dimness now. The sight keeps clear provided something breaks every morning at the top of the nose and discharges; if the discharge does not come away the sight goes thick and dim until it does—sometimes is dim in this way for a day or two, or even a week.

Right Eye: $V=\frac{20}{30}$ imperfectly, disc perhaps a little pale, but not definitely so; vessels of good size.

Left Eye: $V=0$; disc pale; vessels slightly smaller than those of the right eye.

Soon after this (the exact date cannot now be ascertained) a tumour of some kind was removed from the back of the nose at the General Hospital. The patient’s statement is that her mouth was fixed open with an instrument, that the tumour was removed through the mouth, and that she saw it after the nurse had washed it in a basin. From that time the trouble with the

eye ceased entirely, and there remained only a slight occasional discharge from the nose into the throat.

August 4th, 1882 (six years later).—Having succeeded in tracing the patient I found the conditions, at the abovenamed date, to be as follows:—

Right Eye: $H = \frac{1}{10}$, $V = \frac{20}{20}$ imperfectly; visual field, mapped by perimeter, entire; disc and vessels normal.

Left Eye: $V = 0$; disc pale and somewhat retracted; vessels perhaps a little smaller than those of the other eye, but not markedly diminished. Patient says that her right eye never fails now, unless she stoops for a long while together, and then it becomes rather dim. There is still an occasional discharge from the back of the nose into the throat.

There is no direct evidence as to the nature of the tumour in this case, but there can be little doubt that it was a non-malignant growth of some kind. It is unlikely that a malignant growth in the position which this tumour must have occupied could have been completely removed, and there was no recurrence at the end of six years. The profuse and offensive discharge was probably the result of caries of the bony septa upon which the tumour pressed.

There can be no doubt that the disease in the nose was directly or indirectly the cause of the loss of sight, for on one occasion the evacuation of discharges pent up in the nose was immediately followed by restoration of sight to one eye, and on many occasions the retention of the discharge was accompanied by temporary dimness of vision, and after the removal of the tumour the disturbance of sight finally ceased.

Again, it may be safely inferred from the symptoms just mentioned, and from the fact that the optic discs presented no inflammatory or other changes long after one eye was completely blind, that *pressure* was the direct cause of the amaurosis.

The seat of the pressure also may be inferred from the symptoms. It must have been in front of the optic commissure, for if the commissure or optic tracts had

been encroached upon the loss of vision would have occurred in a hemiopic form, whereas one eye was blinded completely and the other recovered with an entire visual field. And on the other hand it cannot have been within the orbital cavities, for there was no proptosis, and there was no sign of pressure upon the nerves or blood-vessels which enter the orbit in the neighbourhood of the optic nerve. It must therefore be referred to that part of each optic nerve which lies in the optic foramen. In a sphenoid bone now before me, in which the cells which hollow out the body of the bone are very well developed, I find that each of these cavities is separated from the optic foramen of the same side only by a very thin plate of bone which constitutes the inner wall of the foramen, and that the septum which separates the cells themselves is also extremely thin. A tumour originating in, or invading, either of these cells might easily destroy the septum between them and might exercise pressure upon both optic nerves in the optic foramina without effecting an entrance either into the orbits or the cranial cavity. It seems in the highest degree probable that this actually occurred in the case under discussion. The actual pressure on the nerves may have been due either to the tumour itself or to discharges imprisoned in its neighbourhood.

The transient attacks of blindness in the seeing eye from which the patient suffered for a short time were suggestive of epileptoid seizures, and they were relieved by bromide of potassium. But it is, I think, not necessary to assume that the disturbance which produced them arose in a different part of the visual apparatus. A little additional fulness of blood-vessels in or near the tumour might momentarily raise the pressure on the nerve to the blinding point, and the tendency to such hyperæmia might be reduced by bromide of potassium. The patient states that the seeing eye still sometimes goes dim if she stoops for long together.

It is worth noting that in these attacks affecting the right eye the darkness appeared to come from the right side. We know that the axial fibres of the nerve at the optic foramen supply the central area of the retina (*vide* O.R., vol. i., p. 311), and if, as is probable, the fibres situated on the inner surface of the nerve pass to the inner half of the retina, pressure from the sphenoidal cells falling first upon these fibres would cause blindness beginning at the outer side of the visual field—in this case the right side.

The occurrence of blindness in connection with disease in the sphenoidal cells is certainly a rare event. No mention of it is made by Leber in his treatise on diseases of the retina and optic nerve (Graefe-Saemisch, vol. 5). Mackenzie discusses very fully the complications which have been observed in connection with various diseased states of the nostril, the maxillary sinus, and the frontal sinus, but with regard to the sphenoidal sinus can only infer, from its communicating with the nostril and being lined by a prolongation of the Schneiderian membrane, that it is liable to the same diseases as these others, and that its dilatation might destroy the functions of the eye (Diseases of the Eye, 4th edition, p. 76). J. Chisholm has recently recorded "two cases of malignant tumour of the sphenoidal cavities implicating vision" (Arch. of Ophth., vol. xi., p. 44); in both of these the optic nerves appear to have suffered atrophy through pressure rather than through neuritis, though there was not the total absence of congestive changes in the discs which was observed in my case, and owing to the malignant nature of the tumours the orbits became invaded, and protrusion of the eyes and paralysis of the ocular muscles were among the symptoms.

I can find no case on record in which an eye-complication has arisen from such a cause without invasion of either the orbital or the crannial cavity, or in which sight has been restored by the removal of the

tumour; but the possibility of blindness originating in this way may be worth remembering in cases of unexplained optic atrophy, and not less so in presence of tumours of the naso-pharynx. In a former paper (O. R., vol. ii., p. 4), I asked attention to the possible connection of such tumours with symptoms of a still more formidable kind.

WARLOMONT (Brussels), DE WECKER (Paris), DENEFFE (Ghent). Jequirity. *Annales d'Oculistique*, March—April, 1883, p. 97.

W. A. BRAILEY (London). On some recent Methods of treating Granular Lids. *Brit. Med. Journ.*, May 19, 1883, p. 954.

De Wecker's recent paper on jequirity (*vide* O. R., vol. ii., p. 19) has naturally excited great interest, and led to many trials of the new drug. The expectation that jequirity might prove to be a real and efficient remedy for trachoma has not, as yet, been very fully realised; but it is clear that some cases which have resisted other kinds of treatment have been greatly benefited by its use; and the unfavourable reports given by some experimenters should certainly not be allowed to stand in the way of further trials.

Warlomont's own contribution to the discussion is little more than a plea for further careful observations. In four cases treated by himself after witnessing de Wecker's practice in Paris, the immediate effect of the application in exciting inflammation was very decided, but not more intense than desirable; the ultimate effect on the granulations was not yet known. His observations in Paris seemed to show that the superficial layer of the granular conjunctiva is transformed into a sort of false membrane without chemosis and without suppuration, and that as this is cast off the granulations perish with it, and the epithelium is reformed beneath. Pannus and corneal ulceration appeared to him to be favourably influenced by the return of the mucous membrane to its natural smoothness.

Deneffe reported to a recent meeting of the Belgian Academy of Medicine the results which jequirity had yielded in his practice. His experience may be summarised as follows :—

The lotion was prepared as formulated by de Wecker (*vide* O. R., vol. ii., p. 19), or by macerating 10 grammes of the decorticated and pulverised seeds for twenty-four hours in cold water and filtering ; its effect appeared to be the same in either case.

The patient bathed his eyes with the lotion three times daily for three days, and for a quarter of an hour or half an hour each time, causing the lotion to enter between the lids ; or he applied it constantly by means of saturated compresses.

Inflammation such as De Wecker has described usually followed. In some cases it was extremely violent by the third day, resembling a true purulent ophthalmia ; in others it was much less intense, and in some it did not occur at all. Two young girls used the lotion for several weeks without producing the slightest irritation of the conjunctiva. (In a girl, aged about 25, at present under my own treatment, a lotion four times stronger than the original formula has failed, after persistent trials, to produce the slightest discharge.—P. S.)

The confinement to a dark room, advised by de Wecker, appeared to be unnecessary.

The pain was sometimes very severe, and prevented sleep.

The discharge varied much in abundance, and was sero-purulent rather than purulent ; a sort of false membrane was usually formed upon the conjunctival surface. In one case erysipelatous patches appeared on the face and neck.

The inflammation was fugitive ; it disappeared in eight or ten days, and could not be prolonged or re-excited by fresh applications.

Therapeutically considered, the inflammation induced by jequirity gave *no results*. The granulations were not removed, and the pannus was not influenced in any way. Not one of the patients treated found benefit. Moreover, the treatment did not appear to be entirely harmless, for in one case it transformed a vascular keratitis into a dense pannus, and in another it perhaps favoured a perforation of the cornea. Finally, Deneffe declared that the jequiritic inflammation will bear no comparison what-

ever, as a remedy for trachoma, with the true purulent ophthalmia excited by inoculation with pus, a method of treatment which has been much cultivated at Ghent. It is altogether fugitive, and cannot, in the few days of its duration, cure granulations which ordinarily require weeks, or even months, of the severer treatment for their removal. He suggests that the so-called chronic granular conjunctivitis, in the treatment of which jequirity has acquired such repute in Brazil, is the condition of papillary hypertrophy which ensues on neglected purulent conjunctivitis, and not the true follicular disease. He quotes Moura Brasil, of Rio Janeiro, to show that the granulations there prevalent are commonly the result of purulent ophthalmia, and he quotes de Wecker himself as declaring that the true trachoma is never caused in this way. It will, however, be seen that de Wecker's experience of jequirity distinctly negatives this suggestion.

De Wecker's last communication on the subject appears in the form of a letter to Dr. Warlomont. He declares that jequirity, like every new remedy, is likely to fall into disrepute through being used in an improper manner, and in unsuitable cases. He defines somewhat more narrowly than before the cases to which it should be applied. The indication for jequirity is the presence of chronic granulation—the true trachoma—and it may be used not only in those cases in which inoculation would be properly applied, but where one eye only is affected, and where, by reason of the slight gravity of the disease, or the presence of corneal ulceration, inoculation is entirely contra-indicated. He refers to cases in his clinique examined by Warlomont which had been greatly benefited by jequirity after long-continued treatment of other kinds had failed.

De Wecker condemns, on the other hand, the use of jequirity for the removal of papillary hypertrophy, such as is produced by chronic purulent ophthalmia. Where suppuration already exists, artificial suppuration must not be superadded. In two instances he had violated this maxim, and had employed jequirity against papillary hypertrophy, in the hope, as he expresses it, that the combat which might take place between the micrococci of the purulent conjunctivitis and those of the jequiritic ophthalmia would end in a general massacre. It

appeared, however, that the two parties made common cause against the sufferer. In both of these cases jequirity did harm rather than good.

He believes that there are other conditions, not granular, such as chronic infiltrations of the cornea, and certain phlyctenular conditions, in which jequirity will prove useful. These require further study. Its effect in clearing up the pannus caused by old granulations is, he assures us, most remarkable, and for this purpose it is to entirely replace inoculation, than which it is safer, and far more easily controlled.

Brailey records a favourable experience of jequirity at Guy's Hospital. Three cases of trachoma in young people are described by him. In each case the disease was treated first for two months with the stick of mitigated nitrate of silver, and in one instance the diseased oculo-palpebral fold was excised according to Galezowski's suggestion. The results so obtained being imperfect, jequirity was employed, and in each case after the membranous formation had disappeared from the conjunctival surfaces there was considerable improvement in the condition of the eyes, though in each case some sago granulations still remained. He declares it his opinion that in jequirity we have a drug of considerable value. Though it does not, in ordinary cases, immediately destroy all granulations, it diminishes very considerably the pain and photophobia, and has a decided influence in clearing the cornea. It does not appear to affect the cornea injuriously, and in this respect must be admitted to have a great advantage over inoculation with pus. It was not found necessary at Guy's Hospital to isolate cases under this treatment in separate wards, no unfavourable influence on other cases having appeared to arise from their proximity.

H. MAGNUS (Breslau). Band-like Opacity of the Cornea (Keratitis trophica). *Klin. Monatsbl. für Augenheilkunde*, Feb., 1883, p. 45.

E. NETTLESHIP (London). A Rare Form of Primary Opacity of the Cornea (Transverse Calcareous Film). *Archives of Ophthalmology*, vol. viii., p. 293, 1880.

Magnus has minutely examined a number of examples of the band-like opacity of the cornea which is occasionally

met with in eyes which have undergone severe inflammatory processes, such as irido-cyclitis and sympathetic inflammation.

Among seventy-five persons who were the subjects of severe ocular diseases this peculiar corneal opacity was found fourteen times ; the individuals thus affected were all young or middle aged.

The clinical appearances differed in different stages. The early stage was well seen in an eye which had been lost through sympathetic inflammation. A dull greyish-brown band, about 2 mm. wide at its broadest part, stretched across the cornea immediately below the horizontal meridian ; internally it reached to the corneal margin, externally it stopped short at about $1\frac{1}{2}$ mm. from it. The surface of the opaque band showed, at numerous points, a superficial loss of substance. The base of the eroded spots presented no purulent secretion and no deposits, but had the same greyish colour as the rest of the band. The remainder of the cornea was perfectly clear and transparent, the opacity being limited to the part habitually exposed by the opening of the lids. The eye, generally, was in a state of subacute irritation ; the ciliary region, especially at the inner margin of the cornea, was strongly injected, and enlarged vessels led up to several of the eroded spots upon the cornea. These conditions produced no subjective symptoms whatever ; the patient felt neither pain nor discomfort, and was not conscious that the eye, which had been blinded by sympathetic inflammation, was affected with any fresh morbid process.

In all the thirteen other cases the process had reached a more advanced stage, and here the most prominent characteristic was the formation of calcareous concretions in the affected area. In some cases these concretions only were present ; in others there was a more or less extensive cloudiness as well. Thus in one case in which the eye had suffered previously from sympathetic inflammation, and had been iridectomised with preservation of a little sight, the cornea presented a transverse row of brilliant white prominent incrustations, but there was no diffuse opacity ; in others there was a broad grayish-white band in which calcareous deposits were visible only here and there. In the latter the opacity hardly differed in appearance from that which ordinarily follows corneal ulceration.

A comparison of the appearances met with in different stages of the affection appears to show that the calcareous deposit is a secondary, rather than a primary change. Magnus thinks it has no relation to a gouty diathesis, as has been supposed, but is simply the result of precipitation from the conjunctival secretion. In considering the etiology of the affection, the *form* of the opacity is, he thinks, of more moment than the cretaceous deposit. The form corresponds closely with that of the aperture between the lids, and that it is really determined by the exposure of the cornea is proved by the fact that in certain cases in which the lid aperture was displaced, or of irregular shape, the corneal opacity still corresponded accurately with it.

The two chief points in the etiology of the affection appear, therefore, to be an antecedent disturbance of the nutrition of the eye by some severe disorder, and the exposure of the cornea in the lid aperture. Hence its occurrence may be explained by supposing that the normal resistance of the cornea to external influences has been reduced by antecedent changes, and that, as a result of this diminished resistance, any portion not habitually covered by the lids is apt to suffer damage. The ocular disorders in connection with which the opacity is usually found must, therefore, not be considered as its direct causes, but simply as conditions which render its occurrence possible; and inasmuch as neither the band-like form nor the calcareous deposits are essential features of the morbid process, it would, Magnus thinks, be better to designate it by the name "*keratitis trophica*," than by the terms ordinarily employed.

Magnus refers to the observations published by Nettleship on the so-called "*transverse calcareous film of the cornea*" as being at variance with his own, but a reference to the paper in question will show that it deals with a different group of cases from that which Magnus has examined.

Nettleship describes a disease which has the following characteristics:—

It is rare; generally very unobtrusive until well advanced; and occurs for the most part in elderly people. Thus in 14 cases, in which the date of its commencement was approximately known, it began after 50 years of age in seven cases; before 30 in only one.

It is much commoner in men than in women ; of 15 affected persons, whose sex is stated, all but 1 were males.

It appears always to affect both eyes, though the one may be affected long before the other. It is frequently uncomplicated by any other manifest ocular disease, the only important symptom being a slowly-increasing dimness of sight commensurate with the size or position of the opacity. In a considerable number of cases, however, it is found in association with glaucoma, or with chronic iritis, which leads to secondary glaucoma ; one or other of these disorders was present in seven out of twenty cases. The sequence of events is uncertain. It would appear that the corneal change is usually, though not invariably, the primary change, and that it leads on to a chronic disorganising iritis which is followed by secondary glaucoma. In a few cases simple or chronic glaucoma has followed the formation of the opacity, without the intervention of iritis.

The exposed part of the cornea is slowly invaded in a nearly transverse direction by a patch or two patches of superficial opacity, oblong or oval in shape, and so opaque when fully formed as quite to hide the corresponding parts of the iris and pupil. The opacity is *beneath the epithelium*. There is never the least trace of ulceration, and the cornea shows, as a rule, no change either in smoothness, transparency or general level.

The opacity never reaches quite up to the corneal border ; a narrow rim of clear cornea may be seen bounding each end of the stripe even in the oldest cases. This clear border is just the part affected by arcus senilis, and is the part most under the influence of the conjunctival vessels. The disease may coexist with arcus senilis.

The opacity is of a light brownish or gray colour, never white, and looks like rather dirty ground-glass viewed from the *unground* side. Examined with a hand-lens it is minutely granular like fine sand, whilst scattered blackish dots, or white chalky-looking specks, or fine, rather sinuous dark lines may sometimes be seen. The dark lines are cracks in the brittle lamina. The limits of the opacity are well defined, and the rest of the cornea is perfectly clear.

If the epithelium is scraped off a hard gritty layer is found beneath it, which can be picked off in small chips as fragments

of shell are taken from an egg. The underlying cornea is clear, and if the patch so cleared be opposite to a clear pupil, good sight will be restored as soon as the epithelium has reformed.

The sensibility of the cornea at the seat of the disease is certainly not abolished even if at all lowered. The operation of scraping, if done without an anæsthetic, gives severe pain.

So far as is known there seems to be no tendency for the film to form again over any part from which it has been chipped away.

The deposit has been found to consist microscopically of small, rounded, highly-refracting grains, closely aggregated, and forming a sort of network with very thick and close meshes. An analysis of these granules showed that they were composed of the same mineral ingredients as ordinary bone, viz., phosphates of lime and magnesia, with a considerable proportion of ordinary bone.

Nettleship expressly separates the so-called *primary opacity* of which his paper treats from the somewhat similar opacity which forms in the cornea of eyes already blinded by other diseases—the class of cases specially discussed by Magnus. He points out the differences between the two affections with regard to the condition of the epithelium, and inclines to the belief that their causes are essentially different.

The *primary opacity* is subepithelial; it occurs only in elderly people, and almost exclusively in men; it consists of lime salts, and there is some ground for connecting it with a gouty condition of the blood. The *secondary opacity* is an indirect result of antecedent damage, occurs at any age and in both sexes, involves the epithelium, and, although spoken of by Magnus as in part a cretaceous deposit, appears, so far as microscopical evidence is forthcoming, to consist of colloid formations in the superficial layers of the cornea together with thickening and degenerative changes in the epithelium (*vide* Goldzieher, *Centralblatt f. prakt. Augenheilk.*, Jan., 1879.) There is however this obvious point of alliance, that in both cases the opacity corresponds closely with the form of the lid aperture, and therefore must depend in both, to some extent, upon exposure.

Remembering the frequent association of the true sub-epithelial cretaceous film, with a condition of increased tension,

it is interesting to note that the ordinary corneal opacity of glaucoma has been found microscopically to depend upon a collection of fluid in the anterior layers of the cornea and immediately beneath the epithelium (Fuchs, O. R., vol. i., p. 126). The explanation, in this case, appears to be that the internal pressure of the eye retards the centripetal streams which normally pass from the cornea into the aqueous chamber (Pflueger, O. R., vol. i., p. 248). It is not difficult, therefore, to imagine how, under predisposing conditions of the blood, an excess of intraocular pressure might lead to the formation of the calcareous film; but if, as appears to be the case, the film may originate independently of increased tension, the question arises whether there are other local changes capable in like manner of resisting the osmosis of the nutrient streams, or whether an abnormal condition of the nutrient fluid itself is sufficient.

The opacity which is met with during glaucomatous attacks is well known to be most marked in the central area of the cornea. It seems worth considering whether in this condition, as in those described above, exposure may have some influence in determining its position.

J. HIRSCHBERG (Berlin). Prognosis of Choroidal Sarcoma. *Virchow's Archiv. f. patholog. Anat.*, Vol. xix., 1882.

The author gives details of thirteen cases of sarcoma of the choroid, eight of which were sufficiently long under observation to justify him in forming an opinion as to their issue.

In five of these eight cases death occurred within two years after enucleation, from metastatic formations without any local recurrence of the morbid growth; in one case the disease recurred locally six years after operation and ended fatally; in one case the patient was alive and healthy ten years, and in another five years, after operation. There were thus six deaths out of eight cases. In the five remaining cases less than two years had elapsed since the enucleation, so that a definite opinion could not be formed as to the final result. A fourteenth case is mentioned, in which von Graefe enucleated an eye containing a sarcoma, and the patient died eight years afterwards from phthisis.

Hirschberg found that metastasis occurred within two years in all his fatal cases, and he calls attention to the fact established by Fuchs that it has never been known to occur more than five years after operation. He concludes, however, that more than half the cases, even including those in which enucleation is performed early, end fatally.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, MAY 10th, 1883.

WM. BOWMAN, F.R.S., President, in the Chair.

Reported by DAWSON, WILLIAMS, M.D.

The President reminded the members that the next meeting, on June 7th, would be devoted to the discussion of a special subject, namely, The Relation of Eye Disease to Disease of the Spinal Cord (*vide* Memorandum by Dr. Gowers, O. R., p. 123).

The immediate Causation of Optic Neuritis in Cases of Intracranial Disease.—Dr. Walter Edmunds and Mr. J. B. Lawford made a communication based on the examination of the optic nerves in eighteen cases—namely, eight of head-injuries, two of tubercular meningitis, two of tumours of the dura mater at the base of the brain, two of cerebellar tumour, and two of cerebral tumour. The cases occurred consecutively at St. Thomas's Hospital. The optic nerves, when they were affected at all, showed signs of inflammation most intense at the peripheral part and in the meninges of the nerves. The authors inferred that the inflammation was communicated to the nerve from its meninges, down which it extended from the meninges at the base of the brain. This view was further supported by an analysis of the cases. Microscopic sections and drawings were exhibited. Dr. Edmunds said that there was distinct evidence that the inflammation commenced on the surface of the optic nerve, and extended towards the centre.

Dr. Brailey agreed with the theory put forward by the writers of the paper; the only fact that appeared to be inconsistent with it was that such extreme oedema of the disc occurred with such slight trace of inflammation in the nerve. Probably, however, this was an inflammatory oedema, and the

reason of its limitation to the disc might be that the trunk of the nerve is closely compressed by the nerve sheath, while at the disc this pressure is absent.

Cases of Recovery from Mild Sympathetic Ophthalmitis.—Mr. Jennings Milles read notes of five cases, in each of which there was a wound of the cornea, together with wound of the ciliary region, or entanglement of the iris. The sympathetic inflammation was of a very mild type, consisting of iritis serosa, without any posterior synechiæ. There was very slight ciliary congestion, and no pain. In every case the sympathising eye made a rapid and uninterrupted recovery. In three cases the exciting eye was enucleated directly symptoms of sympathetic inflammation began. In one, excision was performed for traumatic cataract following a secondary operation, twelve months after all sympathetic symptoms had disappeared. In one, excision was performed twenty-two days before sympathetic inflammation appeared; in this case, the exciting cause was an extraction of cataract, performed fifteen days before the excision. The author showed some micro-photographs, illustrating the conditions of iridocyclitis and neuroretinitis found in the excised eyes. He stated that he was indebted to Mr. Watson Cheyne for being able to exhibit them. These cases were opposed to the dictum of Mauthner, "that one should not excise in serous iritis," for they proved that excision did no harm. On the other hand, they did not support the view that excision had any power to modify or arrest the progress of sympathetic ophthalmitis, when once started. Stress was laid on the importance of the constant use of atropine, and the rigid exclusion of light by keeping the patient in a dark room with a bandage over the eyes.

Mr. Power said that, at St. Bartholomew's Hospital, Chatham, he had seen a large number of cases of wounds of the eye, of every degree of severity, among the workmen at the dockyard. When the wound was extensive, and the eye so seriously injured that it could not again become useful, immediate excision was certainly the proper treatment. In the cases of smaller punctured wounds with protrusion of the iris, he thought that the best practice was to do a large iridectomy with a keratome, so as to completely liberate the iris from all incarceration. After the operation both eyes ought to be

bandaged, and the patient kept in a dark room for two or three weeks. When the lens was damaged, the danger was usually so great as to render excision of the eye necessary.

Mr. Couper observed that though Mr. Milles' cases showed that sympathetic ophthalmitis might sometimes occur in a very mild form, they unfortunately did not afford any indications by which to solve the question, in any given case, whether the attack would continue mild, or suddenly become severe and destroy the eye.

Mr. Adams Frost related the case of a girl, aged 10, who had received a punctured wound of the cornea, close to the sclerocorneal junction, the lens being injured. At the end of seven weeks the lens was beginning to be absorbed, and the iris was adherent; at the end of eight and a half weeks she had an attack of sympathetic ophthalmitis, with papillitis; by the twentieth week vision was quite normal, and the only remains of the sympathetic ophthalmitis was the papillitis. Atropine, which had up to this time been constantly used, was now discontinued. Ten weeks later the patient, who had in the interval suffered no pain, came back with the iris everywhere toughly adherent; atropine was now useless. The case showed the importance of keeping up the use of atropine long after the apparent subsidence of sympathetic ophthalmitis.

The President urged that exclusion of light, and the continual use of atropine, so long as it did not cause irritation, were of the utmost importance. He recalled the following remarkable case:—A child was brought to him a few days after the onset of sympathetic ophthalmitis. The other eye had been rendered useless by the injury, and was immediately excised. Previous to the excision the sympathising eye was tense, the iris adherent and bulging, and there was keratitis punctata; after the excision the tension immediately became normal; after many weeks of iritis the eye quieted down, but complete posterior synechia with bulging of the iris remained. The case was so marked that he made a drawing of it. Treatment by atropine and a dark room was persevered in, and when he saw the child a year after the accident, the eye appeared absolutely free from disease, and showed no trace of the extensive synechiæ which he had most carefully observed some months earlier. The case had made a great impression on his mind, and was

most encouraging. He agreed with Mr. Power as to the value of an iridectomy embracing the whole of any incarcerated portion of the iris, and all that was in relation with the site of the injury. If this could not be completely done, it was well to detach the incarcerated portion of iris from the remainder, so as to prevent straining and dragging.

A New Registering Perimeter.—Mr. Priestley Smith exhibited an improved form of the perimeter described by him a few months ago (*vide* O. R., vol. i., p. 372). In the original instrument the sight-object traversed the visual field in concentric circles. This method, though advantageous in certain cases—namely, wherever the limiting line of the field runs in a meridional direction—is not universally applicable. With the instrument as now constructed, the field can be traversed with equal ease either in meridians or in circles; it is thus more efficient, as well as being simpler in construction. The axis which carries the quadrant has, fixed to its posterior extremity, a wooden disc or hand-wheel, balanced so that the quadrant stands in any position without fixing. The chart is placed upon the posterior surface of the hand-wheel, and rotates with it. Behind the chart is a bracket carrying a horizontal fixed scale, the divisions of which correspond with the circles on the chart; and when the instrument is rotated, whatever position the quadrant assumes, the corresponding meridian of the chart stands against this scale. In consequence of this automatic movement of the chart, the readings obtained on the quadrant are very easily pricked off upon it by a steel pencil held in the hand of the operator. The advantages of the arrangement are, that the chart is visible to the operator throughout the whole of the examination, and that it indicates by its own position the exact position of the quadrant. Thus any particular part of the field can be at once brought under examination by bringing that point on the chart round to the scale, and re-examination can be made of any point at any time by placing the original chart in the instrument. The perfected instrument is in the hands of Messrs. Pickard and Curry.

An Ophthalmoscope for Artists.—Mr. J. E. Adams showed an ophthalmoscope, the mirror of which could be held before the eye of the observer by means of an elastic band round the forehead, while the object lens was held in like manner before

the patient's eye. This arrangement leaves the hands at liberty for drawing.

Peculiar Changes at the Yellow Spot.—Mr. J. E. Adams showed drawings of a peculiar appearance at the yellow spot. The patient was a woman. The affected area was slightly raised in each eye; the nature of the patch was uncertain, very probably it was a physiological peculiarity.

A New Refraction Ophthalmoscope.—Mr. Couper exhibited an ophthalmoscope of novel and ingenious construction. The body of the instrument is a long flat strip of metal wide enough to accommodate two rows of lenses placed side by side. The lenses lie in grooves, in which they slide along the whole length of the instrument, and round the ends, like an endless chain, the one row passing up while the other passes down; they are not attached to each other, and the whole series is propelled quite easily by a wheel inserted half-way down the handle, with projections passing into the interstices between the lenses. Each lens carries its own number, and is flattened on one edge to prevent its rotating in the groove. The mirror is inclined. The advantage of the arrangement is that though the width of the instrument is little more than one inch, and thus offers no obstacle to a close direct examination of the eye, it can be furnished with any desired number of lenses simply by making it longer or shorter. The instrument exhibited was about a foot long and contained seventy-four lenses.

Asthenopia.—Dr. Brailey made the following communications:—1. The case of a delicate child, aged 7, in whom asthenopic symptoms were immediately and perfectly relieved by the use of a 4° prism, base in, divided between the two eyes. Both internal and external recti were absolutely weak, the latter apparently even more so than the former. There was no hypermetropia. 2. A case in which a prism, placed vertically, relieved symptoms of asthenopia. Correction by sphericals and cylinders gave partial relief, which was rendered complete by the addition of a prism of 3° , placed before the left eye with the apex down. The case was very like one reported to the Society by the author in 1881.

Pseudo-glioma.—Dr. Brailey also read notes of a case illustrating the development of the condition known as pseudo-glioma. The disease began with an acute febrile attack, with

swelling and redness of the lid, and proptosis and injection of the globe. Afterwards the eye became slightly shrunken; the iris-periphery was retracted; and a whitish reflex was visible from behind the clear lens. The author judged the case to be one of spontaneous suppurative hyalitis.

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CASE OF TRAUMATIC ANEURISM OF THE LEFT ORBIT CURED BY COMPRESSION OF THE CAROTID ARTERY OF THE SAME SIDE.

By C. E. GLASCOTT, M.D.,

SURGEON TO THE MANCHESTER ROYAL EYE HOSPITAL.

J. B., a packer, aged 42, was engaged on the 1st of August last in tightening a rope round a bale of goods by means of a wooden lever shod with iron, when the rope broke, and the end of the lever flying up hit him on the left side of the forehead, over the eyebrow, with such force as to knock him down in the direction of a hoist hole which was behind him. The hoist door being unfortunately open, he continued his fall down the well, a distance of some twelve feet, falling he thinks, on the top of his head. He was picked up insensible and conveyed to the Royal Infirmary, being placed under the care of Mr. Walter Whitehead, to whose courtesy I am indebted for the information that "on admission he was suffering from concussion of the brain, contusion of the back, and subconjunctival extravasation of blood in the *left* eye. He had no paralysis, but complained subsequently of dim vision in the *right* eye, but this had almost passed away when he was discharged on the 12th of August."

The first night after his return home, and thirteen days after the accident, on going to bed he noticed a whizzing noise in his head, which has persisted ever since. He then went to Southport to recruit for a fortnight, and on the day of his return, a month after the accident (September 21), his left eye began to water, and the next day to swell and protrude.

On the 26th of September he came under my care at the Royal Eye Hospital, at which date the left globe was protruding an inch beyond the other, was fixed, and turned outwards and downwards. The upper lid was slightly swollen, and the lower was concealed by a large fold of chemosed conjunctiva. The cornea and anterior chamber were normal; the pupil was

normal in size and active; the vision was, however, reduced to 16 Jaeger. Ophthalmoscopically the retinal veins were much enlarged, but there was no neuritis. The ocular conjunctiva was inflamed, and the veins greatly distended, tortuous, and varicose. At the intero-superior angle of the orbit a large vessel was seen pulsating, which, on palpation, conveyed a distinct thrill to the fingers. On applying the stethoscope at a point a quarter of an inch above the supraorbital notch, a loud blowing murmur was audible, propagated towards the vertex, and remarkably limited in area. The murmur was not continuous, and was synchronous with the cardiac systole. The heart sounds were normal, pulse 68, and temperature normal. As is usual in these cases, the subjective symptoms—whizzing in the head and pain—were much increased by stooping or lying on one side. The diagnosis made was that of orbital aneurism.

On admission patient was put on light diet, and had 10-grain doses of iodide of potassium three times a day, which after three days' administration had to be diminished to $2\frac{1}{2}$ -grains, as symptoms of iodism supervened. We now found that the blowing murmur and whizzing in the head could be temporarily arrested by compression of the left carotid, and more fully by compressing both. Thereupon compression of the left carotid was determined upon, and means were devised to that end by providing the patient with a compressor formed of a wooden knitting pin, with its head protected by a firm pad, and under the careful tutelage of the House Surgeon the patient soon learned to compress his carotid so firmly as to arrest all pulsation in the orbit for two minutes at a time, pressure being applied every quarter of an hour or so. He is a very intelligent man, and the object of this treatment having been explained to him, he kept up the compression with great assiduity.

After three days' compression the noise in the head had somewhat subsided, and the patient expressed himself much relieved from pain; on the fourth day some of the intra-ocular veins gave way, as evidenced by hæmorrhage into the anterior chamber, and the patient seemed altogether worse. The day after this increase of venous congestion the patient said the pain in the head was much better, and since then the roll of chemosed conjunctiva is much smaller in size, the mobility of the globe is somewhat restored upwards and

outwards, and the exophthalmos is not so marked. Owing probably to the stretching of the optic nerve and also to the effusion of blood into the vitreous; vision had deteriorated very much, and a day or two later, though the hyphema was being absorbed, and the cornea remained clear, I found there was no perception of light.

On the 6th of November the conjunctival chemosis had entirely disappeared, and the pulsation in the vessels very much lessened; but the patient complained for the first time of a severe pain of a burning character in the head at the point where the bruit was heard of maximum intensity. He said that the whizzing in the head was gone. On the 12th, six days later, he expressed himself entirely free from pain, the angular vessel pulsated very feebly, but felt hard and cordy to the touch as if it contained a firm clot. The exophthalmos had so much subsided that he could now close the lids. A fortnight later the mobility of the eye had become almost normal in all directions, but the cornea was a little steamy looking, and the tension had increased.

On the 11th of December a large vessel running over the inferior border of the orbit, probably the angular artery was noticed to pulsate strongly and visibly for the first time. On inquiry, I found that the patient had felt himself so much better, that he had neglected to compress his carotid for some days. As he complained very much of the restrictions that had been placed upon his diet since he first came under treatment, I allowed him on this day to eat meat for the first time; previously he had been only allowed light puddings, milk, and beef tea. On the 21st of December he became an out-patient. The large vessel at the inferior inner angle had ceased to pulsate, the sclerotic injection had passed away, a few large highly-gorged and tortuous conjunctival veins ramifying over its surface standing out in bold relief against the white sclera beneath. There was no pulsation to be felt at any part of the orbit, the patient was free from pain, and careful auscultation failed to detect any bruit. There was an old blood-clot at the bottom of the anterior chamber, and the tension of the eye had increased to T+3, there being no perception of light. He was instructed not to work, and to compress the carotid occasionally.

I last saw the patient on the first of March, when he attended as an out-patient, and informed me that he had resumed full work as a packer. There was then not the slightest proptosis, nor any pulsation in the orbit, the lens was opaque, and the pupil wide and fixed, T+1, a few congested conjunctival vessels were still to be seen meandering over the globe.

The details of this case speak for themselves, and, I think, show pretty conclusively that compression, even of an intermittent character, and possibly not even at any time so firm as to do more than retard the blood stream, is of use in traumatic aneurisms of the orbit. Of course here I had a great advantage in having a very intelligent patient to deal with, and one who ably seconded all efforts made on his behalf, besides having him under constant observation in the Hospital.

The encouraging result obtained in this case will lead me, in any subsequent case of a similar nature that I may have to treat, to try compression as fully as possible first, before undertaking the graver operation of ligature of the carotid.

THE EFFECTS OF STRONG LIGHT UPON THE EYE.

BY DAVID LITTLE, M.D.,

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In the April and May numbers, 1883, of the Ophthalmic Review, some interesting observations are made on the effect of light on the eye. Two such cases have come under my notice in my own practice; and as they are well marked and probably unusual, I desire to place them on record.

1.—RETINITIS PRODUCED BY STRONG ELECTRIC LIGHT.

A gentleman engaged in scientific experiments with the electric light in the laboratory of a University had neglected on one occasion to put on his dark spectacles whilst thus operating; the box containing the electric light was suddenly opened, and the light fell upon his right eye. It was a great shock to him, and he was blinded for several minutes; his eyes were very intolerant of light for some days afterwards, and he suffered a good deal from headache.

In June, 1882, he consulted me on account of a mist and dark specks before his *right* eye, which had existed ever since the accident, two months previously.

The vision of the right eye was equal to $\frac{20}{50}$. Ophthalmoscopic examination revealed distinct haziness over the optic nerve and the retina immediately round it. The vision of the left eye was good, and the fundus normal.

I advised him to wear tinted glasses, and to abstain from all work with his eyes for some time. As he left this part of the country a few days afterwards I was unable to observe the case further.

2.—BLEPHAROSPASM CAUSED BY LIGHTNING.

A gentleman, aged 56, whilst walking with a friend in a thunderstorm, was struck down by lightning, but was not rendered insensible. On getting up he found he could not open his eyes. Two days afterwards he was led into my consulting room by his son, who stated that he had not been able to open his eyes since he was struck by the lightning. He had well marked Blepharospasm in both eyes, exactly like that sometimes met with in hysteria. He said the eyes were hot and painful, but there was no apparent inflammation. Ophthalmoscopic examination could not be made. The patient remained in this condition for thirteen days, when he opened his eyes partially; then each day he steadily improved and ultimately recovered with good vision, and a perfectly normal fundus.

I am not at all certain that this spasm was due directly to lightning. I am more disposed to think it was due to fright.

A MODE OF ILLUMINATING THE PERIMETER.

BY PRIESTLEY SMITH.

An ideally perfect illumination of the perimeter implies an equal illumination of the test-object in all parts of the visual field, and an equal supply of light on all occasions, for only under these conditions have the readings a precise value when compared one with another; moreover, the supply of light should be variable at will. It is practically impossible to fulfil these conditions completely, but a very simple arrangement which I have lately adopted in my own consulting room gives a near approach to them, and may perhaps be found useful by others.

So far as the distribution of the light is concerned it answers well to seat the patient with his back to a large window, and as close to it as possible; it is then only at the upper and lower parts of the hemisphere that the test-object is insufficiently illuminated, and these do not lie within the sentient field. Care is of course necessary that there are no surrounding objects, the brightness or colour of which would interfere with the perception of the test-object, and when testing with colours this condition is difficult to ensure. But the main objections to the use of daylight are its inconstant amount and its frequent deficiency.

Artificial light, on the other hand, enables us to command a practically equal intensity of illumination at all times, and one which we can moderate at will; the only difficulty is to distribute it equally over all parts of the field. A naked flame cannot illuminate the test-object equally in all positions unless it be placed at the centre of the hemisphere—the position occupied by the patient's eye; if placed above the patient's head or on

one side of it, a shadow falls upon a portion of the field, and the angle at which the light strikes the test-object is very different in different places. What is wanted is a diffused light from a large area behind the patient, such as is obtained when he is placed with his back to the window.

Upon the glass chimney of my ophthalmoscopic lamp I hang a light piece of tin, which embraces it half way round, and reflects the whole of the light backwards upon the wall. The wall behind the lamp is papered white over an area about four feet square, and this white surface being strongly illuminated throws forward a diffused light around the patient's head, which gives a fairly equal illumination over the whole of the visual field. All other light being excluded from the room there is a background of darkness, against which the test-object stands out clearly. The centre of the white area on the wall corresponds in height with the patient's head. The lamp may be either immediately above the head or behind it. For ophthalmoscopic purposes a black curtain hangs over the whitened area of the wall; when the perimeter is to be used this is drawn aside, and the screen already described is hung upon the chimney of the lamp.

A. YVERT (Philippeville). Unilateral Albuminuric Retinitis in a patient possessing only one kidney, situated on the same side, and attacked by Parenchymatous Nephritis. *Recueil d'Ophthalmologie*, March, 1883, p. 145.

Yvert records a very remarkable case. It would appear to show that the well-known association of retinal changes with disease of the kidney depends upon something more direct than the general systemic alterations in the blood or the blood-vessels to which it has hitherto been attributed. The only alternative view of the case seems to be that the absence of the one kidney was in no way accountable for the exemption of the eye of the same side from retinitis albuminurica, but

each of these conditions is so rare that the co-existence of the two by chance is in the highest degree unlikely.

The patient, a Spaniard, aged 43, was admitted to the military hospital of Philippeville, under the care of Dr. Richard, on *December 7th*, 1882. He presented an appearance of profound cachexia, general anasarca, signs of a recent epididymitis on both sides, hypertrophy of the prostate gland, and a hydrocele of the right tunica vaginalis. The urine contained mucus and albumen; only a very few renal elements were discoverable under the microscope.

The eyes were examined by Yvert on *December 15th*. The *right* appeared absolutely healthy; not a trace of obscurity infiltration or hæmorrhage in the retina. The *left* presented characteristic albuminuric retinitis; two yellowish-white patches near the optic disc situated behind the retinal vessels, and thereby distinguished as degenerative and not exudative changes, and a large number of much smaller dots and patches arranged concentrically in the region of the macula; also a few punctiform hæmorrhages; vision was practically normal, but the patient complained of some slight mistiness.

On *December 26th* the amount of albumen had much increased, and for the last twenty-four hours the patient had noticed a marked failure of vision in the left eye, while the right remained unaffected; examination of the eyes revealed:—*Right eye*, normal acuity, and completely normal appearances in the fundus carefully examined in the erect as well as in the inverted image. *Left eye*, vision so far reduced that fingers could not be counted at the distance of a few inches; in the retina a number of fresh patches, both exudative and degenerative, occupying the whole region of the macula, and extending slightly above and below the papilla; the disc itself intact, and with well-defined margins; five or six hæmorrhagic spots in the region of the macula.

On *December 29th* the amount of albumen was still greater, and the general condition of the patient worse. *Right eye*, absolutely normal. *Left eye*, changes in the retina intensified, and two large flame-shaped hæmorrhages, radiating in the direction of the fibres, near to the disc.

Two days later, that is, *December 31st*, the albumen had diminished, and vision slightly improved, and during the

following fortnight there was a steady daily improvement in the general condition of the patient, and in the vision of the affected eye, until, on *January 15th*, at which time the amount of albumen was smaller than at the last examination, the left eye could again read ordinary print. The *right eye*, again carefully examined, remained absolutely free from discoverable change.

The improvement was of short duration; the albuminuria again became intensified, and general anasarca supervened; bed-sores formed, and the patient died on *February 17th*. During the last few weeks the eyes were again several times examined, the *right* remained entirely normal, while the *left* progressed in correspondence with the general disease.

Post-mortem examination revealed an entire absence of the right kidney, renal artery, renal vein and ureter; the right supra-renal capsule occupied its usual place, and was of normal dimensions. The space normally filled by the kidney was occupied by a portion of the right lobe of the liver, which was greatly hypertrophied; the left kidney occupied its normal position, stood quite vertical, and reached downwards to the level of the third lumbar vertebra, being surmounted by the supra-renal capsule. Its volume was about double that of the normal kidney, its weight, with the capsule, 360 grammes: macroscopically and microscopically it presented the changes characteristic of the large white kidney — parenchymatous nephritis.

Commenting on the foregoing case Yvert calls attention first to the extreme rarity of a unilateral albuminuric retinitis. Among about eighty cases examined by himself both eyes were affected in all. He also quotes from the writings of Warlomont and Abadie to the same effect, and to this we may add that Leber speaks of the disease as being almost without exception a bilateral one; the only exceptional case known to himself being one in which there was an unusual ring-like defect in the visual field, but no well-marked or characteristic ophthalmoscopic change (Graefe-Saemisch, vol. v., p. 584). It certainly sometimes happens that one eye is affected a little in advance of and rather more intensely than the other, but the difference in the present case was something more than this, for the patient was two months under notice, and while the

one eye suffered in a high degree, the other remained entirely exempt until death. Secondly, he points out that the visible changes in the diseased retina as well as the impairment in sight, varied in such close correspondence with the better or worse condition of the urine as to prove beyond question a connection between the disease of the kidney and that of the eye.

The current theory which attributes the retinal disease to the depraved condition of the blood, together with the cardiac hypertrophy and alterations in the blood vessels, is insufficient in the present case. Yvert therefore falls back upon the hypothesis of a reflex nerve-influence as the only feasible one. In support of the idea he refers to a series of five cases recently published by Professor Potain (*Gazette des Hôpitaux*, February 17, 1883), and accounted for in like manner by invocation of the sympathetic nervous system. The cases are very briefly summarised as follows :—

1.—A woman received a severe blow in the left lumbar region ; suffered severe pain on this side ; hæmaturia ; dysuria, and swelling of the limbs ; swelling of the face, especially on the left side. The anasarca disappeared after a time, but returned the following year, and persisted even fourteen years later in the form of a slight permanent œdema of the left leg.

2.—A man received a blow on the loins, chiefly on the right side ; œdema of the whole of the right side followed.

3.—A woman received a violent contusion in the region of the left kidney, from which resulted an enormous general anasarca, much more pronounced on the left side than on the right.

4.—A plumber, after suffering a severe blow in the region of the kidneys, presented anasarca of the whole of the right side, and albuminuria.

5.—An individual received a contusion in the right flank and subsequently was attacked with œdematous swelling in the right cheek, gradually spreading to the eyelids. Ophthalmia on the same side, and albuminuria.

Finally, Yvert urges that with a view to investigating the supposed intimate connection between an inflamed kidney and the retina of the same side, careful examination of the sympathetic trunk should be made in cases of death from disease of the kidney.

E. NORDENSON (Paris). **An Ophthalmometric Study of Corneal Astigmatism in Scholars ranging from 7 to 20 years of age.** *Annales d'Oculistique, March—April, 1883, p. 110.*

With the help of the ophthalmometer of Javal and Schiötz, Nordenson has obtained some interesting statistics as to the frequency of corneal astigmatism. Previous to the invention of this instrument, such statistics were almost unattainable, for the optical effect of asymmetry in the cornea is frequently neutralised by the lens, and is therefore not discoverable by the ordinary methods of testing the refraction of the eye as a whole; corneal astigmatism must be studied objectively, and the only accurate instrument hitherto available, the ophthalmometer of Helmholtz, demands the expenditure of too much time to be applicable to the examination of large numbers.

Nordenson examined the eyes of 226 scholars at the Ecole Alsacienne in Paris, varying in age from 7 to 20 years. Each scholar was tested as to the following points:—1. The distance at which he could read Snellen's type number 6, metric. 2. Irregular astigmatism of the cornea; the direction of the meridians of greatest and least curvature of the cornea; the amount of regular astigmatism of the cornea; the refraction of the cornea in the meridian of least curvature. 3. The nearest point of distinct binocular vision. 4. The condition of the fundus. 5. The visual acuity and the refraction of each eye separately, with Javal's optometer. 6. Colour-perception, according to Holmgren's method. The results are set forth in a series of tables, from which we extract the following percentages. The total number of observations is not large enough to justify a very close general application of these figures, but they prove, beyond a dispute, a frequency of corneal astigmatism much greater than has previously been supposed.

Number examined, 226 persons: 452 eyes.

1. Among these 226 persons there was:—

Emmetropia	...	..	...	in 69·9 per cent.
Myopia	...	...	...	in 14·6 „
Hypermetropia (manifest)	...			in 13·7 „
Antimetropia (<i>i.e.</i> , refraction of different kinds in the two eyes)				in 1·7 „

It may be assumed that the group of hypermetropes contains some cases of latent hypermetropia.

2. Irregular corneal astigmatism caused by keratitis in 2.6 per cent.

3. Total absence of corneal astigmatism, or an amount too small to be measured (*i.e.*, less than .25 D), in 4.4 per cent. Nine out of the ten non-astigmatic persons had a visual acuity greater than $1\frac{1}{2}$. Among the emmetropes there was absence of measureable corneal astigmatism in 5 per cent, among hypermetropes in 3 per cent, among persons myopic in both eyes not one was free from astigmatism. Among the whole of the 452 eyes there was absence of measureable corneal astigmatism in 9.2 per cent., viz. :—

Among the emmetropic ... in 10.6 per cent.

Among the hypermetropic ... in 6.3 „

Among the myopic ... in 5.7 „

4. The corneal meridian of least curvature was, in the whole number of eyes—

Horizontal... ... in 77.2 per cent.

Vertical in 1.3 „

Oblique in 12.0 „

In each class of refraction the meridian of least curvature was most commonly horizontal. It was vertical in only six eyes, and of these five were myopic. The oblique position was relatively the most frequent in eyes with manifest hypermetropia.

5. Corneal astigmatism equal to at least 1 D was found, among the whole number of persons, in 30.5 per cent.; greater than 1.5 D in 1.7 per cent.

6. In each class of refraction the corneal astigmatism was more frequently equal than unequal in the two eyes. Inequality was relatively the most frequent in hypermetropic persons. The highest degree of corneal astigmatism met with was in a hypermetrope. The mean degree also was greatest among the hypermetropes.

7. Among 158 young persons with emmetropia or latent hypermetropia V was greater than 6/6 in 89 per cent.

8. The refractive power of the cornea, in the meridian of least curvature, was equal in the two eyes, among emmetropes in 50 per cent. Among hypermetropes and among myopes

inequality was more frequent than equality. The average inequality was greatest among myopes.

9. The average refractive power of the cornea in the meridian of least curvature was—

In all the eyes together 42·8 D, radius 7·873 mm.

In hypermetropic eyes 42·5 D, „ 7·937 „

In myopic eyes 43·6 D, „ 7·739 „

Thus the average radius of the cornea in the meridian of least curvature was found to be shorter in the myopic than in the emmetropic and hypermetropic eyes. This is at variance with the results obtained by Donders, who found no essential difference of corneal curvature in ametropia and emmetropia. But Nordenson's observations were made on eyes with slight myopia only—never higher than 3·5 D—and the number was not very large; moreover, as Nordenson admits, the new ophthalmometer gives less accurate measurements of corneal curvature than of degrees of astigmatism; hence this observation does not affect Donders' conclusion that in extreme degrees of myopia the cornea is flatter than in the normal eye.

Nordenson found no evidence of alteration in corneal curvature between the ages of 7 and 20, certainly no facts to support Reuss's opinion that the refraction of the cornea becomes suddenly less at about the age of 12. He points out, however, that for the precise determination of these points repeated measurements must be made at intervals upon the same individuals.

Among the facts brought to light by this research, perhaps the most interesting is that a corneal astigmatism equal to at least one and a half dioptries is quite compatible in young people with normal acuity of vision. Nordenson comes to the conclusion that a correction of corneal astigmatism by means of the crystalline lens is, in young persons, the general rule (*vide* Javal, O. R., vol ii., p. 53). His observations also support the opinion of Javal that astigmatism predisposes to myopia. Thus there was not a single instance of myopia among the nine scholars who were totally free from corneal astigmatism, while amongst the thirty-two myopic scholars not one was free from astigmatism, and two-thirds of them had at least half a dioptric of this defect in both eyes

D. HUNT (Boston). On the Causation of Myopia.
New York Medical Journal, March 10th, 1883, p. 255.

Prevailing theory attributes the production of myopia in great part to the mechanical strain which is involved in prolonged accommodation and convergence of the eyes upon near objects; it explains the tendency to hereditary descent by assuming a transmission of structural peculiarities which render the eyes specially liable to yield to this strain.

Hunt points to the absence of positive proofs of these positions. He declines to admit the heredity, because myopia frequently arises in families where no trace of a myopic ancestor can be found, and because myopic parents frequently beget non-myopic children; with regard to the exciting causes, which according to general belief, are to be found chiefly in the circumstances of the education of the young, he maintains that although bad lighting, bad type, etc., may doubtless aggravate the lesions which affect the myopic eye, it is a question whether such influences ever *caused* a case of myopia. Although the author, in our opinion, underrates the value of ascertained facts in this question, the hypothesis which he himself advances seems to demand consideration in connection with them.

In its early development the eye-vesicle is essentially a portion of the brain; it develops from the same structure as the hemispheres, a little behind their point of origin. Later on, just as the skull, the membranes, and the blood-vessels of the brain are formed from the layer of connective (mesoblastic) tissue surrounding the brain, so the sclera and choroid are formed from the layer surrounding the eye. It seems reasonable to suppose that, as the brain tissue during its growth impresses a type upon the tissue containing it, which is afterwards made permanent in the bony skull, so the tissue composing the eye impresses its type upon the tissue which is to form the sclera; hence the author argues that a variation in the form of the eye, such as that which characterises myopia, is more likely to stand in direct correlation with the development of the brain than to arise from functional abuse or immediate hereditary transmission.

The characteristic of the eye of civilised as compared with uncivilised man is variability of refractive type (myopia, hypermetropia, astigmatism), so the author asserts; and this

want of fixity he would refer to the increased functional activity and development of brain tissue. The greater size of the cerebral hemispheres, causing the greater frontal development of civilised man, and the greater complexity of the convolutions, represents a greater development of epiblastic tissue, and this may disturb in various ways the correlated growth of the eye. In applying this hypothesis it is not necessary to demonstrate the co-existence of the largest eyes and the largest hemispheres; the relation in a given individual may be influenced in many ways. How far the greater development of the convolutions in civilised man may be attended by an increase of cell growth in the young embryo, capable of affecting that part of the brain forming the eye of the young embryo, it is apparently impossible to determine. The supposition that it may have some influence is in accordance with physiological laws.

J. J. CHISHOLM (Baltimore). Bromide of Ethyl the most perfect Anæsthetic for short, painful Surgical Operations. *Maryland Medical Journal*, 1st January, 1883.

Chisholm reports a highly favourable experience of bromide of ethyl. It appears that this anæsthetic, which was brought prominently forward as a substitute for chloroform about three years ago by Dr. Levis and Dr. Turnbull, of Philadelphia, fell suddenly into disuse in the United States in consequence of two deaths occurring under its influence. Chisholm's own experience of it was, at first, unfavourable, for in more than one case nausea and vomiting of great severity were induced; more recent experiments, however, have proved, he tells us, that, administered in the proper manner, it is distinctly the very best anæsthetic which can be used for painful operations of short duration.

Proper precautions being taken, complete anæsthesia is produced in less than one minute, often in from twenty to thirty seconds. The narcosis is profound, but does not last more than one or two minutes, and recovery is so rapid and complete, with freedom from nausea and heaviness, that, as a rule, five minutes after the inhalation the patient is as much himself as though no anæsthetic had been used.

Great stress is laid upon the mode of administration. As with other anæsthetics the recumbent posture is the only safe one ; the neck clothing is to be loosened, the head only slightly elevated ; a preliminary dose of whiskey is not found necessary ; though, previous to chloroform administration, Chisholm makes an invariable rule of giving it. Unlike what obtains in the case of chloroform, a saturated ethyl vapour must be inhaled, with exclusion of atmospheric air, in order to obtain a speedy and effectual narcosis. And further, it is to be observed that the bromide of ethyl is not, like chloroform, an anæsthetic, the inhalation of which can advantageously be repeated or prolonged for any length of time.

The best inhaler is a thick towel folded into the form of a small cone with closed apex, and, for the more complete exclusion of air, a sheet of paper may be placed between the folds, and the base of the cone must be wide enough to enclose both mouth and nose. The patient should be instructed how to make long inspirations, and even made to go through the process of doing so beforehand, so that he shall know exactly what to do. He should be told to inspire strongly in spite of feeling somewhat stifled, and may be assured that a very few inspirations will put him to sleep. About one drachm of the bromide of ethyl is to be poured into the cone, and the latter immediately placed over the nose and mouth of the patient ; some patients will at first hold the breath, and children will usually struggle to escape, but there is no fear of their not drawing their breath in time, and the cone must not be removed from the face for an instant until anæsthesia is produced.

As a rule, a dozen full inspirations are sufficient to produce deep narcosis, and it sometimes occurs as early as the sixth ; there is then a stoppage of all struggling, complete relaxation follows, with quiet breathing, and touching the conjunctiva produces no reflex movement ; the patient retains the usual healthy colour of lips and cheeks as if in ordinary sleep, and the pulse grows slower and stronger as the narcosis becomes profound. In thirty seconds, as a rule, the patient is ready for operation.

The anæsthesia lasts not more than two or three minutes, and often not so long ; usually the patient awakes suddenly

and completely, as though from ordinary sleep ; he is able to get down from the operating table without assistance, and to walk off without staggering.

Chisholm states his experience of the drug as comprising more than 400 administrations ; he finds it well adapted for all short operations, such as the examination of the eyes of children, the removal of tarsal tumours, the opening of abscesses, and exploration of orbital sinuses, incision of the canaliculi, and probing of the nasal duct, the removal of foreign bodies from the cornea, canthotomy, strabismus operations, iridectomy for artificial pupil, destruction of ingrowing eyelashes by the cautery, needle operations for soft or capsular cataract, and even optico-ciliary neurotomy. On the other hand, cataract extraction, enucleations, and many lid operations require more time than ethyl narcosis affords. He prophesies that those who will use it by a single application to produce a short, deep sleep, and not resort to a mal-administration for the purpose of a continued anæsthesia, which it is incapable of sustaining with safety or comfort, will become as enthusiastic as himself over the results obtained.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, JUNE 7th, 1883.

WM. BOWMAN, F.R.S., President, in the Chair.

Reported by DAWSON WILLIAMS, M.D.

DISCUSSION ON EYE-SYMPTOMS IN SPINAL DISEASE.

DR. GOWERS said that the points to which he had asked attention in his memorandum related to two classes of symptoms—optic nerve atrophy and intraocular palsies (*vide* O. R., vol. ii., p. 123). Two general facts deserved mention at the outset. First, that these symptoms are associations, and not effects, of the spinal lesion. The evidence of this is, that disease of the cord of any nature may exist in any degree, in any part, without the occurrence of these symptoms (if we except the rare paralysis of the dilators of the pupil in disease

of the sympathetic tract in the cervical region of the cord); that the ocular symptoms, which may be absent when the cord-disease is advanced, may exist in extreme degree when such disease is in an early stage; and that, with the exception of the sympathetic symptoms just mentioned, we know of no anatomical connection or functional mechanism by which the disease of the cord can produce the ocular symptoms. Secondly, that the ocular symptoms result from degenerative processes, and their presence shows that the cord-disease also is degenerative,—an indication of extreme value in cases in which acute processes mask the underlying degeneration.

Optic nerve atrophy is chiefly associated with locomotor ataxy; in other spinal diseases it is rare. As long as ataxy was believed to be a disease confined to the posterior columns of the spinal cord the concurrence of a peripheral degeneration in the optic nerve was an anomaly; but recent researches, chiefly of Pierret (confirmed in part by Déjerine) have demonstrated the frequency of degeneration in the peripheral cutaneous nerves, and its occasional occurrence in the optic centres, and our conception of the disease is thus enlarged from a mere affection of the spinal cord to a wide sensory neurosis, in which optic nerve atrophy falls into a definite place. But as the peripheral spinal and central optic changes cannot yet be detected during life, we must confine our clinical study to associations which can be recognised.

What proportion of cases of atrophy are tabetic? or, putting the question practically, In what proportion is there neither knee-jerk nor lightning pains—the two earliest symptoms? The question can only be answered by ophthalmic surgeons. If spinal symptoms are altogether absent at the time of examination we are not justified in assuming that they will occur later.

It is more difficult still to determine in what proportion of cases of tabes atrophy occurs, because the spinal and ocular symptoms tend to separate the patients. Probably the proportion does not exceed 15 per cent. Dividing the course of tabes into three stages—(1) before affection of gait, (2) while the patient can still walk, (3) when he cannot walk except with the aid of another person, it is found that atrophy begins twice as frequently in the first stage as in the second, and very rarely in the third, and a combination of the observations of

ophthalmic surgeons and of physicians would probably show the excess in the first stage to be still larger. Not only does atrophy commence, but it advances rapidly in the first stage, while the spinal symptoms often remain stationary ; coming on in the later stages of the disease it often has a less progressive character.

The symptoms of the optic atrophy present more diversity than is generally admitted. While colour-vision is often impaired early, the field for white does not always contract before central vision fails. It may be unrestricted when there is considerable loss of acuity. The affection of sight probably varies in character, just as does the impairment of sensation in the legs. Irregular defects in the fields bear upon the question of localising the degeneration ; initial temporal hemiopia has been twice observed, loss of the lower nasal quadrants once, the former suggesting that the chief lesion was at the chiasma. The occurrence of amblyopia without change in the optic disc bears upon the same question ; in one case acuity was reduced to one-tenth, without any visible change in the disc. Rapid increase in the failure of sight is sometimes met with, just as is sudden increase in the spinal symptoms ; is this attended with any variation in the appearance of the disc ? Some discs are clear and excavated, others are occupied by a soft gelatinous-looking tissue ; does any difference in course correspond with this difference in aspect ? In one case, with rapid failure, the grey tissue in the disc was very abundant.

In other spinal diseases optic atrophy is very rare ; it is occasionally seen in insular sclerosis, less frequently in lateral sclerosis, never in progressive muscular atrophy, or myelitis. Probably this is due to the fact that these affect chiefly the motor, tabes the sensory tracts. In general paralysis of the insane, which, though not strictly speaking a disease of the spinal cord, is often attended with spinal changes, atrophy is more common.

Intraocular paralysis comprises the second group of symptoms. Accommodation, associated contraction of the pupil, light-reflex contraction, and skin-reflex dilatation, are all subserved by centres lying beneath the aqueduct of Sylvius ; the path of the last is circuitous, comprehending the cervical part of the spinal cord and the cervical sympathetic. Like atrophy,

the intraocular palsies are as common in tabes as they are rare in other diseases of the spinal cord. Loss of the light-reflex alone is most common, then total paralysis, and then palsy of accommodation without loss of the light reflex. Among seventy-two cases of primary degenerative ataxy, there was some defect of the intraocular muscles in sixty-six. Light-reflex alone was lost in forty-eight, and impaired in seven; *i.e.*, lost in two-thirds, and affected in three-quarters of the cases. In the remaining eleven cases (15 per cent. of the whole) the pupil did not contract on an effort at accommodation, and in most of these accommodation was also lost. In two cases accommodation was lost in one eye, and light-reflex in both; in one case, accommodation was lost in both eyes, light-reflex in one; in two cases, accommodation was lost, light-reflex was perfect. The percentage of cases presenting intraocular palsies was, in the first stage of tabes, eighty-four; in the second, ninety-three; in the third, one hundred. Thus, the symptoms usually begin early, but there is a manifest tendency for the cases which escape at first to suffer later on. As a rule, there is no correspondence between the pupil symptoms (size, inequality, or irregularity) and the spinal symptoms; but in one case of tabes the pupil was smaller on one side, and on this there was unilateral sweating of head and face, probably from sympathetic paralysis. The reflex dilatation, on stimulation of the skin (to the loss of which, when the light-reflex is lost, Erb has called attention), cannot, with all care, be invariably obtained in persons beyond middle age. Though usually lost with the light-reflex it sometimes persists, especially when the pupils are large.

Intraocular palsies are excessively rare in other diseases of the spinal cord, with the exception of general paralysis of the insane. The instances of this disease which come among hospital out-patients present slighter mental changes and a less progressive course than the asylum cases. In them the impairment of the intraocular muscles (usually loss of the light-reflex) is almost as frequent as in tabes, being present in two-thirds of the cases. Intraocular palsies may occur without spinal disease, and are often preceded by constitutional syphilis, as Mr. Hutchinson has shown in the case of ophthalmoplegia interna. Of fifteen such cases there was a history of consti-

tutional syphilis in seven—a fact of considerable interest in connection with the frequency of the symptom in tabes, and the disputed relation of syphilis to the latter disease. The pupil symptoms are doubtless, in these cases, due to a degenerative process; but we are as little justified in denying, as we should be in affirming, their relation to syphilis.

Dr. HUGHLINGS-JACKSON attached great value to the foregoing paper. He dwelt on the variety and complexity of symptoms in tabes dorsalis—joint affections, gastric crises, several very different morbid affections of the eyes, bladder symptoms, etc. Of the so-called typical symptoms, one or more may be absent; ataxy is often absent; with ataxy, the knee-jerks may be present. In one case of seventeen years' duration, the Argyll-Robertson symptom was not found. Some of the so-called typical symptoms occur in other diseases. The commonest pupil symptom occurs in some cases of general paresis. Knee-jerk is absent in many morbid conditions—*e.g.*, diphtherial paralysis, a disease which, superficially regarded, has sometimes a great likeness to locomotor ataxy. There are degrees of some, at least, of the symptoms; thus no ataxy, degrees of ataxy, and, so to speak, a degree beyond ataxy, an inability to walk at all. If there are not degrees of pupillary conditions, there are various such conditions. The width of the symptomatology is exceedingly different in different cases. There may be the Argyll-Robertson phenomenon with no other definite nervous symptoms, and when so, the nature of the case, beyond perhaps the vague diagnosis of nerve-degeneration, cannot be determined. A case of tabes without ataxy may present a far wider symptomatology than one with ataxy.

Though eye-symptoms are common with disease of the cord, they are unknown with lesion of the cord, except when it occurs in the cilio-spinal region, as, for example, in a section of half the cord from a stab with a knife (contractions of pupil on same side, and narrowing of the ocular aperture).

The Argyll-Robertson pupil is found not only when sight is slightly impaired, but also when there is only bare perception of light; in one case he found it when the loss of sight was absolute. The pupils enlarge when the patient "makes

believe" to look at the clouds, and contract when he makes believe to look at his fingers held near him. On the other hand, with considerable impairment of sight, the pupils may remain contractile to light. To illustrate the varying width of association of optic atrophy with other tabetic symptoms, he mentioned five cases—(1) atrophy of one optic nerve and then of the other (green appearing grey, and red reddish brown), pupils acting to light, gait good, jerks present; in short, no other symptoms except lightning pains; (2) optic atrophy with the Argyll-Robertson condition, and without pains; and for the rest (colour-perception was not tested) like the former case; (3) like 2, but with pains also; (4) optic atrophy (blind eight years) Argyll-Robertson condition, gait good, no knee-jerks; (5) a much more rapid case; pains one year, blindness complete, except for bare perception of light in six months; could only just stand (loss of sight, no doubt, contributing to this disability); no knee-jerks.

There are also cases of double optic neuritis, with absent knee-jerks:—A woman; bare perception of light, reeling gait, no knee-jerks, who, after mercurial inunction and iodide of potassium, got well, except that, when last seen, she had no return of the knee-jerks. A girl, seen with Mr. Bowman; double optic neuritis, reeling gait, no knee-jerks then nor after; later, right hemiplegia and aphasia; no necropsy. A man with tumour of the left cerebral hemisphere; aphasia and right hemiplegia; both knee-jerks present at first, both lost later; no morbid changes found in spinal cord by Dr. James Anderson. He had seen double optic neuritis with absent knee-jerks, and no, or at any rate no other, localising symptoms. The jerks are present in some cases of tumour of the cerebellum, with double optic neuritis, in one case of a lateral lobe, in another of the middle lobe (necropsies).

He had said that diphtherial paralysis was owing to a morbid affection of the sympathetic system; he ought to have said that the ocular, the palatal, and the rarer circulatory symptoms (great slowness of pulse) are morbid affections of parts supplied through ganglia of the sympathetic; he believed the spinal cord, as well as higher parts of the nervous system, to be morbidly affected in this disease. He had not seen a case of so-called diphtherial amaurosis in a stage when the paralysis of the ciliary

muscle was complete; in some cases, where accommodation was only weak, he thought the pupils acted well to light whilst the action during accommodation was at least imperfect. In one case the knee-jerks did not reappear until one year after all the symptoms of diphtherial paralysis had gone.

The SPEAKER then cited cases illustrating the various intraocular palsies met with in tabes. (1.) Sudden and complete loss of both pupillary actions and of accommodation on but one side; gait good; no knee-jerks; there had been lightning pains four or five years; the other eye, carefully examined for the Argyll-Robertson condition, was normal. (2.) The same condition as in the last case, except that the so-called good eye presented the Argyll-Robertson symptom. This patient, a healthy-looking intelligent sea-captain, had no other symptoms, mental or physical; hence the feature of his case could only be guessed at. (3.) Argyll-Robertson condition on but one side; ataxy, lightning pains, no knee-jerks. (4.) A woman; loss of action of one pupil to light and during accommodation, accommodation itself being absolutely perfect (examined by Mr. Couper); the pupil of the other eye was normal; that eye had all her life been slightly defective; no other symptoms of any sort were discoverable, except the most significant one of absent knee-jerks. (5.) The same ocular condition on both sides (examined by Mr. Couper); ataxy, lightning pains, no knee-jerks. (6.) The same ocular conditions, except that accommodation was slightly weaker than usual at the patient's age (examined by Mr. Nettleship); gastric crises, ataxy, lightning pains, no knee-jerks. (7.) Both pupils acting in no way, accommodation of each eye good; ophthalmoplegia externa; the only further tabetic symptom was absence of one knee-jerk and nearly loss of the other. The speaker expressed his belief that Dr. Gower's able paper would help greatly in precise and methodical investigation of tabes dorsalis.

Mr. W. Bevan Lewis.—A paper on *Ocular Symptoms occurring in General Paralysis of the Insane*, read by the SECRETARY. By the systematic examination of a large number of cases the author has been led to the following conclusions:— (1.) A loss of reflex dilatation of the pupil to sensory stimulation occurs in the greater number of cases of general paralysis of

the insane. (2.) Next to this condition the most frequent accompaniment of the disease is loss of pupillary reaction to light (reflex iridoplegia). (3.) In 23 per cent. of the cases the movements on accommodation are completely lost. (4.) In a few cases, cycloplegia is associated with this. (5.) Ophthalmoplegia interna is found only in advanced stages of the disease ; in one case, it appeared to commence as reflex iridoplegia. (6.) Reflex iridoplegia is always present when the movements on accommodation are impaired or lost (with an exception in one case). (7.) Spinal symptoms (such as absence of patellar reflex) are by no means especially associated with the more grave ocular troubles. Judging from the nature and progress of the disease, its duration, the history of cases in the earlier stages, and the condition of the paralytic in the more advanced stage, the sequence of morbid phenomena occurring in the iris in this disease appears to be this :—That there is, first of all, loss of reflex dilatation to cutaneous stimulation ; next, the action to light is lost ; and in the final stage, ophthalmoplegia interna is developed, and becomes in the end complete.

Dr. SAVAGE, speaking in response to a call from the President, said that he believed that the examination of the optic disc would increase our knowledge of general paralysis of the insane. In conjunction with Mr. Henry Power, he had a good many years ago made careful observations on a large number of these patients with the sphygmograph and the ophthalmoscope, but the results had been purely negative. In recent years, however, he had come to appreciate certain changes occurring in the discs, not of all, but of a considerable number of patients suffering from general paralysis. In one class tabetic symptoms were prominent, and sometimes preceded the other symptoms by many years ; in these cases changes in the disc were common ; he had, however, only recently learnt that these changes were not confined to the patients who presented tabetic symptoms, but that they occurred also in those who presented symptoms of lateral sclerosis. The question arose whether this lateral sclerosis was secondary to degeneration of the motor tracts in the brain. He had met with a few cases of general paralysis of the insane occurring in young single men of steady

habits, where lateral sclerosis developed secondarily to intellectual symptoms, and in these cases there were changes in the discs. It was now generally recognised that "general paralysis" is a wide term, embracing a number of separable conditions; in making this subdivision, a careful attention to alterations in the optic discs and in the reflex phenomena would be of great assistance.

ADJOURNED DISCUSSION,

FRIDAY, JUNE 8TH, 1883.

R. BRUDENELL CARTER, F.R.C.S., Vice-President, in the Chair.

DR. WALTER EDMUNDS related a case in which there was complete temporary blindness. The patient, a man aged 57, had syphilis nine years before he came under observation; six years later he fell from his horse and hurt his neck, and, three months after this first fall, he again fell from his horse during, as he thought, an attack of unconsciousness. Soon after this he one day suddenly became blind, without any giddiness, headache, vomiting, or loss of consciousness; the blindness remained for a quarter of an hour. At subsequent periods he had three attacks of vomiting. When he came under observation his gait was awkward, but not ataxic, the pupils did not react to light, and in accommodation the right reacted less than the left.

Mr. J. B. LAWFOORD read notes of seven cases of general paralysis of the insane with optic atrophy. In five of these there were symptoms of spinal sclerosis; tabetic in one, lateral-sclerotic in the others. Of twenty-two cases of general paralysis recently examined at Bethlem, he had found optic atrophy in three, in all of which special symptoms were present. Microscopic sections and drawings of the optic nerves, chiasma, and tracts of one of the cases were exhibited.

Mr. R. M. GUNN, referring to the question of the frequency of symptoms of locomotor ataxy in cases of optic atrophy, stated that out of eighteen cases admitted during his term of office at Moorfields, two undoubtedly had the disease, and in three others there was a suspicion of it. As to the date at which the atrophy supervened; out of nine cases of ataxy, seven had

optic atrophy, and in all it appeared during the first stage ; in five of these cases the changes were more marked in the left eye, in two in the right eye, in three cases the changes were known to have commenced in the left eye. He cited three instances of temporary arrest of the atrophy, and even of slight improvement. Also the case of a woman who, after an attack of intermittent fever, became the subject of widespread paralysis, which lasted for two years ; she also had exophthalmic goitre ; about a year ago it was noticed that the pupils were small, and did not act to light, but acted to accommodation, that there was paresis of the external rectus and slight ptosis on the left side, and that the knee-jerks were diminished ; recently it was ascertained that the paralysis of the ocular muscles had disappeared, that the pupils acted to light, and not to accommodation, and that the knee-jerk was absent.

Dr. MAHOMED said it should be remembered that in dealing with diseases of the nervous system we were dealing with diseases of one organ and of one tissue ; it was everywhere continuous, and its diseases were similarly, in many cases, continuous, that is uniformly distributed throughout it. In observing changes in the optic disc, or in testing intraocular reflex phenomena, we might be only discovering, in the most susceptible part of the system, disorder which might exist in a lesser degree in all the coarser reflex actions. He thought there was a tendency to attach too much importance to individual symptoms, and to attribute to them a greater pathognomonic significance than they deserved. He quoted several cases to show that too much importance ought not to be attached to alteration in the knee-jerk, to ankle-clonus, or to nystagmus, as evidence of structural disease.

Dr. S. J. SHARKEY narrated three cases. (1.) A woman who, at the age of twenty-nine, began to suffer from giddiness, thickness of speech, trembling (on the right side chiefly), and severe headache ; three months later she came under the care of Mr. Hulke, with optic neuritis and defective sight in the left eye. Dr. Sharkey saw her first, when thirty-four years of age, and found incomplete atrophy of both optic discs, and distinct symptoms of disseminated sclerosis. (2.) A man came under care when twenty-two years of age, with the right disc hazy and slightly cedematous ; a year later he was admitted into

St. Thomas's Hospital, under Mr. Nettleship, with the right disc in a state of grey atrophy; the left disc could be only imperfectly seen, owing to old corneal opacities. Three years later, when twenty-six years old, he came under Dr. Sharkey's care with characteristic symptoms of disseminated sclerosis. (3.) A man, aged 42, presented symptoms of the same disease; these symptoms were said to have been present for about fifteen years, but his sight had only been failing for about twelve months. Vision was $\frac{20}{70}$; and the discs were slightly pale and misty all over, the borders being nowhere quite clear. Vision subsequently slightly improved.

MR. NETTLESHIP said that there were clinical reasons for believing that optic nerve-changes in locomotor ataxy begin at the disc, not in the trunk of the nerve or optic tract; he had seen no unequivocal cases of spinal disease in which sight failed before ophthalmoscopic changes became apparent, whilst it was commonly observed, on the other hand, that the appearances of atrophy are more pronounced than the condition of the sight would lead us to expect. Of seventy-two patients under his care with progressive atrophy of the optic nerves, thirty-six were undoubtedly tabetic, eight had symptoms of mixed spinal and cerebral disease (allied to general paralysis), seven had some other forms of chronic spinal disease, not ataxy, eight had, besides optic atrophy, reflex iridoplegia ("spinal pupils"), but no other symptoms of disease of cord or brain; in the remaining thirteen there was no proof of disease of the nervous system, but in some of these the notes were incomplete. He had been struck with the rarity of the complete absence of spinal symptoms in progressive atrophy. Alluding to the mode of failure of vision in progressive atrophy, he pointed out that the field of vision is often invaded in a precisely symmetrical manner in the two eyes, although, at any given time, one eye is usually worse than the other. He had only seen two or three cases in which one eye became quite blind before the other began to fail.

MR. BRUDENELL CARTER said that the foregoing papers contained a great wealth of material, and showed plainly the complexity of the problem. It would be a great gain if even a hypothesis could be framed which would guide the practitioner in the prognosis of the class of cases in which atrophy

occurs. He had been accustomed to attach great importance to the continued presence of the knee-jerk, but Mr. Lawford's cases seemed to show that, even with this, the prognosis might be grave. He felt the want of some standard by which to test such cases.

Mr. MCHARDY related the case of a woman suffering from disseminated sclerosis, in whom there was papery atrophy of the optic disc and retinitis pigmentosa of the left eye, while the right eye presented no morbid condition, and had vision very little below normal.

Dr. GOWERS, in reply, said that he was much gratified by the interest which the discussion had excited. Mr. Gunn's case of Graves's disease was one of great interest and complexity, and was remarkable because the loss of the reflex to light preceded the loss of the knee-jerk. With regard to Dr. Mahomed's remarks, he wished to observe that the manner in which certain tracts of the nervous system suffered was very striking; for instance, the lateral column of the cord might be destroyed, and the rest of the system remain intact; he preferred to regard it as one tissue, but containing many organs. The knee-jerk was very seldom absent in health; in a paper in the Transactions of the Royal Medical and Chirurgical Society he had recorded a few cases, but he had not since met with a single instance, and was, therefore, inclined to doubt the accuracy of his earlier observations. In testing the pupil for the light-reaction, there were several fallacies to be guarded against; if artificial light were used, it was especially necessary to see that the patient did not accommodate for the source of light. Dr. Sharkey's cases were extremely interesting. It was necessary to remember that in disseminated sclerosis sight might be lost, owing to a patch of sclerosis in the trunk of the optic nerve, without any primary atrophy of the disc.

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UNIOULAR REFLEX IRIDOPLEGIA, ASSOCIATED
WITH NECROSIS OF THE ORBITAL ROOF ON
THE SAME SIDE, AND WITH DOUBLE OPTIC
NEURITIS.

BY HENRY EALES,

SURGEON TO THE BIRMINGHAM AND MIDLAND EYE HOSPITAL.

H. B., aged 28, a fitter by trade, was admitted into the General Hospital on September 4th, 1882, under the care of Dr. Russell, suffering from continuous headache, with frequent delirium and double optic neuritis. He had, moreover, a fluctuating swelling above and on the outer side of the right eye.

The history was that about three years previous to coming under Dr. Russell's care he contracted syphilis, but he does not appear to have suffered much from any secondary symptoms. In October, 1881, while fighting with a companion, he received a blow over the right temple, and had suffered ever since with almost continuous headache, but had had no vomiting. Lately his headache had been much aggravated; a swelling formed over the right eye, and a week after this he applied at the General Hospital for advice.

On September 6th, by Dr. Russell's kind permission and desire, I saw the case. At this time the patient was suffering from continuous muttering delirium, and was only roused with great difficulty to reply to questions, his answers being for the most part incoherent. He complained of severe pain in the head. There was great swelling, redness, and heat of the upper eyelid on the right side, most marked just below the external angle of the orbit, between it and the eyeball, presenting distinct fluctuation. The eyeball did not appear to be much displaced or protruded, but movement upwards was considerably limited, and less than on the other side. On ophthalmoscopic examination I found well-marked

double optic papillitis of equal intensity in the two eyes. There was great swelling of the papilla, and congestion of the retinal veins, but not much exudation of lymph. Apart from the fulness of the veins, the retina was normal, except just around the disc.

No abnormality of either pupil was noted at this time.

Dr. Barling, the House Surgeon, made a free incision into the swelling in my presence, under the carbolic spray, an anæsthetic having been previously administered to the patient. About an ounce and a half of foetid pus was thus evacuated, and on introducing the finger into the wound, an area of necrosed bone, about the size of a shilling, was felt just within the external angle of the frontal bone, in the orbital roof, apparently not extending far back into the orbit. The wound was dressed antiseptically, a drainage-tube being inserted. The patient was taking large doses of iodide of potassium and bichloride of mercury, and has done so without intermission ever since. In due course he got better, and was discharged from the hospital.

I did not see the patient again until May 12, 1883, when he called to see me, at Dr. Russell's request. I then found his condition to be as follows:—He was very sluggish in comprehending questions; his speech was thick, and produced as if by an effort; his hearing was very defective in the left ear, but this appeared to be an old trouble, and the cause of it was not ascertained. From a sinus over the external angle of the right orbit a piece of necrosed bone projected; there was scarcely any discharge from this sinus. The external angle of the frontal bone and adjoining superciliary ridge appeared to be absent. *Ophthalmoscopic examination* showed no traces of the previous neuritis in either eye, except a few fine whitish streaks, seen only by the direct method, in the immediate neighbourhood of the disc and its vessels; $V = \frac{16}{xii}$ readily with each eye, and most of the letters of $\frac{15}{x}$. The field of vision was normal for colours (hand test). There was slight limitation of the upward movements of the right eye, but all other movements were free. Accommodation was good with either eye up to five inches, but convergence was not maintained, the left eye soon deviating outwards. The right pupil was fixed in a state midway between dilatation and contraction, and neither contracted to light, nor dilated more

in the dark, being smaller or larger than its companion according to the intensity of the light, and being in moderate daylight of the same size as the other. It contracted readily, however, during convergence. The movements of the left pupil appeared to be perfectly normal.

On June 16th I again saw the patient, and found his eye conditions the same as before. He stated that two days previously, while drilling sheet iron, he was seized suddenly with loss of power on the right side, affecting both the arm and leg, so that he could only stand if leaning against the wall. This was accompanied by giddiness and inability to speak, which lasted an hour or so, but he did not lose consciousness. When his speech returned, his wife says she could not understand what he said for some hours. His muscular power was considerably less in the right hand than in the left at this visit. He had so far recovered from the attack as to be about as well as previous to its occurrence, but his muscular power on both sides seemed deficient. I have lately ascertained (July 21st) that the knee-jerk is perfect on both sides; the point was not noted at the earlier examination. The conditions remain unaltered.

In the foregoing case the blow over the temple was probably the determining cause of the local affection to which syphilis predisposed. Without denying, especially in the face of the recent observations of Edmunds and Lawford, that meningitis, due to the local bone affection, may have caused the papillitis, I entirely agree with the opinion of Dr. Russell that the papillitis was more probably due to an independent intracranial syphiloma.

The most interesting point to me was the iridoplegia—(a) because of its being uniocular, (b) because of its occurrence in a syphilitic male, and (c) because of its association with optic neuritis and cerebral disease, and not with primary optic atrophy and spinal disease, as we usually find it in locomotor ataxy and general paralysis. Gowers and Hutchinson have specially pointed out that intraocular palsies, including reflex iridoplegia, occur in syphilis without spinal disease, and to this cause I

attribute it in this case ; its being uniocular is only another instance of syphilis producing an anomaly.

In this case we had, I think, necrosis in the orbit, intracranial syphiloma, and iridoplegia, all due to syphilis, but not, as might at first seem probable, related to one another as cause and effect. I take this opportunity of thanking Dr. Russell for his kind permission to examine and to publish this case.

THE ADVANTAGES OF THE PLANE OPHTHALMOSCOPIC MIRROR IN RETINOSCOPY.

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The subject of Retinoscopy has been so excellently handled from a practical standpoint by Dr. Morton in his little work on Refraction (London: H. K. Lewis, 1882), and its scientific basis so ably treated of by Dr. Charnley (Ophth. Hosp. Reports, X., 3, p. 344), that it may seem superfluous to write anything further upon it for the benefit of the profession in this country. I am induced, however, to bring the subject again under the notice of Ophthalmic Surgeons owing to the considerable advantages I have myself experienced from using a plane instead of a concave mirror, and from observing that Dr. Chibret has thought it of sufficient practical importance to publish an article upon the subject in the "Annales d' Oculistique" (vol. 88, Nov.-Dec., 1882, p. 238). The point of view taken by Dr. Chibret differs from mine, as will be seen further on. That there is room for some publication on the subject may be inferred from the fact that Dr. Morton (*loc. cit.*) insists upon the necessity of using a concave mirror, and Dr. Charnley (*loc. cit.*) devotes the whole of his elaborate article to describing the behaviour of the shadows observed when a concave mirror is used, merely adding in a footnote that the motions observed are reversed if the mirror used be plane or convex. It was by accident indeed

that I was first led to try the effect of a plane mirror during last autumn in consequence of having broken my concave one, and now, after more than six* months' experience of its use, I am more than ever convinced of its superiority to the concave mirror generally employed, both in ease and rapidity of examinations, and in what is more important—accuracy of results.

What takes place in the ordinary method of testing refraction by Retinoscopy with a concave mirror is the following. The observer, armed with a concave mirror of some 22 cm. focal length, seats himself about 1 m. 20 cm. in front of the patient, behind whose head a lamp is placed. The observer cannot remove himself farther than this from the patient, as the divergence of the rays of light from the minute image formed at the focus of the mirror is such that at any greater distance sufficient light does not enter the patient's pupil to enable any observations at all to be made upon the motions of the light or the shadows at the bottom of the fundus. If, under these circumstances, the mirror be rotated so as to move the reflected light across the patient's pupil, an illuminated area with a shadow on each side of it is observed to cross the fundus of the patient's eye. If it cross the fundus apparently in the same direction as the mirror is rotated, the refraction in that meridian is myopic. But if it cross the fundus apparently in the direction opposite to that of the rotation of the mirror, the refraction may be hypermetropic, emmetropic, or even myopic. In the latter case, however, the myopia will not be greater than 1 D. To distinguish between these three conditions convex glasses must be placed in front of the patient's eye. First, a convex glass of 1 D is used. If then the shadows continue to move against the mirror the eye is hypermetropic. But if they move in the same direction as the mirror, yet another convex glass must be

* This Paper was written in March.

substituted for $+1$ D. This time, $+0.75$ is used, and then if the shadows move with the mirror the eye is myopic, and if they move against the mirror the eye is emmetropic.

This, though easy enough to work in practice, is sufficiently complicated to appal anyone who has the good or bad fortune to have to teach this method to the ordinary medical student, but the matter becomes still more involved when we proceed to measure the amount of ametropia. If the shadows move with the mirror at least 1 D of myopia is present. Concave glasses are then put in front of the patient's eye until the weakest one is found which makes the shadows move against the mirror. This glass, however, is not to be regarded as the measure of the myopia, but one which is 0.75 D higher. Again, if the shadows move against the mirror the weakest convex glass must be sought which reverses this movement, and it is then known that not this glass, but one which is weaker by 1 D, is the measure of the hypermetropia.

I have omitted the reasoning which establishes the correctness of these rules, which are given in their shortest and simplest form. It is simple enough to anyone who understands the principles involved, and would take up too much space if given sufficiently completely to demonstrate the truth of the positions to those unfamiliar with the subject. Besides, anyone interested in the question can find it all most lucidly dealt with in Dr. Morton's little work mentioned above.

It is obvious that unless the observer is farther away from the patient than the far point of the latter's eye when this eye is myopic there will be no difference in the motions observed in hypermetropia and myopia. In fact the motion will be always what it is when H is present. To detect M the observer must be sufficiently beyond the patient's far point to be able to have some sight, however indistinct, of the real inverted image of the fundus formed at that point. Now, with a concave

mirror, for the reason given above, Retinoscopy cannot be satisfactorily carried out at a greater distance from the patient than 1 m. 20 cm. or thereabouts, so that all degrees of M less than 1 D exhibit hypermetropic movements of the shadows. With a plane mirror, however, sufficient light can be obtained to examine through a fairly dilated pupil at 4·5 m., or even further than that from the patient, so that except in degrees of M, below 0·25 D myopic movement can be observed. Myopia of less than 0·25 D may be treated as emmetropia, from which it is almost indistinguishable—indeed none of the ordinary cases of trial glasses contain lenses weak enough to neutralise it.

When then with a plane mirror at a distance of 4·5 m. we find the hypermetropic movement, we conclude that there is no myopia, and in estimating the amount of ametropia we have no additions or subtractions to make, but declare at once that the weakest concave glass which produces hypermetropic movement is the measure of the myopia, and the strongest convex glass which allows the same movement is the measure of the hypermetropia. This manifestly simplifies the rules immensely—in fact reduces them to those laid down for the subjective test—and this simplification becomes an important matter when one has to explain the method to others. In this respect, indeed, the plane mirror has another slight advantage, which is no doubt a very trivial thing, but saves the average medical student a certain amount of confusion. It is that when the plane mirror is used in Retinoscopy the motions observed happen to be the same as those of the disc and blood-vessels in the method of testing refraction by the use of the mirror alone—viz., in the same direction as the observer or the mirror moves in H, and in the opposite direction in M.

It may perhaps be useful to point out why it is in Retinoscopy that the motions observed with a plane mirror are the reverse of those seen when a concave one

is used. With a concave mirror the source of the light entering the patient's eye is a real inverted image of the lamp situated at the focus of the mirror, and when the mirror is rotated from left to right this image moves also from left to right, and consequently the image on the patient's retina moves from right to left. But when a plane mirror is used the source of light is a virtual erect image of the lamp situated as much behind the mirror as the lamp is in front of it, and when the mirror is rotated from left to right this image moves from right to left, and consequently the inverted image on the patient's retina moves from left to right, or in the same direction as the mirror has been rotated.

Anyone can ascertain the correctness of these statements at once by simply rotating the two different mirrors in front of his face so as to cast the reflection of a lamp or candle across his pupil. It will at once be seen that with a concave mirror the real inverted image of the lamp moves in the same direction as the mirror is rotated, while with a plane mirror the erect virtual image of the same light moves in the direction opposite to that of the rotation of the mirror.

It is of course in the quantitative estimation of astigmatism that Retinoscopy is especially useful ; but there is an additional advantage connected with the use of a plane mirror which forms the original portion of Dr. Chibret's paper referred to above, and which may be worth mentioning, although methods which can only approximately determine the degree of ametropia are not regarded by the ophthalmic specialist with the same favour or interest as those which give accurate results. This method of Dr. Chibret's certainly enables the observer to approximately determine the degree of myopia, if myopia is present, in a shorter time than it can be done by any method I am acquainted with.

The difference in the apparent motions of the light and shadows on the retina in Retinoscopy, in hypermetropic, and in myopic eyes depends, as is well known,

upon the fact that in M the observer is looking at an inverted image of the patient's fundus situated at the far point of the patient's eye. If the observer is closer to the patient than this point the motion seen in M is the same as that in H. Chibret then simply measures the distance from the patient's eye at which he loses the myopic movements of the light and shadows observed in Retinoscopy, and this point is the far point of the patient's eye. If the observer comes any closer than this he gets movements as they occur in H. It is obvious that a concave mirror would be unsuitable for this purpose, as in high degrees of M its focus would be situated actually behind the patient's eye. I have tested this method in a few cases, and I can corroborate Dr. Chibret's statement that it is easy to arrive within an inch or so of the exact point. It is not sufficiently exact to estimate astigmatism quantitatively, but it seems admirably adapted to the purpose for which Dr. Chibret proposed it, viz.—to test rapidly whether in a recruit the myopia which may be present is greater or less than 6 D.

An approximate estimation of the amount of ametropia can also be made by noticing the rate of the movement, the degree of luminosity, and the curvature of the shadows on each side of the illuminated area. Now, in using a concave mirror the smallest and brightest image is formed upon the patient's retina when the focus of the mirror coincides with the patient's far point—that is to say, under the usual conditions, when there is myopia present to the amount of 1 D. Any variation from $M = 1$ D diminishes the brightness and increases the size of the retinal image. The rate of movement with equally rapid rotations of the mirror is, however, fastest in E, because, as has been pointed out by Dr. Charnley, a smaller portion of the fundus is visible to the observer than in H or M, and consequently the image takes a shorter time to cross it. But with a plane mirror not alone is the rate of movement fastest in E for the reason given, but also the image is at its smallest

and brightest in this condition of the refraction, because the light entering the eye of the patient comes from a point situated as far behind the mirror as the lamp is in front of it, so that when the observer is 4·5 m. distant from the patient the rays of light which reach the latter proceed from a point at least 9 m. distant from him, a distance so great that the rays of light may be regarded as parallel.

In only one respect, so far as I can see, has a concave mirror any advantage over a plane one. The observer using a concave mirror can seat himself comfortably in front of his patient with his box of trial glasses on a table beside him, and can change the glasses in the spectacle frame on the patient's nose without moving from his seat, as he is not more than four feet distant from the eye under examination. This distance can also be made use of when the observer is armed with a plane mirror; but to get the full advantage of the latter it is better to remove oneself to a greater distance from the patient, so that one has to walk backwards and forwards to change the trial lenses. The exercise must, however, be regarded as an advantage to those leading such sedentary lives as oculists are compelled to pass, and the apparent loss of time is more than made up for by the greater rapidity with which a surgeon can arrive at the important facts of a case when he has not the habit of sitting in a comfortable chair to listen to the statements of patients.

In conclusion it may be well to recapitulate the following points :—

(*a*) In using a plane mirror for Retinoscopy stand as far from the patient as the illumination admits, and with a large pupil this distance may be as great as 4·5 m.

(*b*) If, at the distance of 4·5 m the light and shadows move in the same direction as the mirror the case is one of E or H.

(*c*) If they move in the direction opposite to that of the mirror the case is one of M.

(d') The brighter and smaller the image of the light on the patient's retina, and the faster it moves, the nearer is the refraction to E.

(e) In correcting, the weakest concave glass which produces a movement with the mirror is the measure of M, and the strongest convex glass which still permits of this movement is the measure of H.

OTTO BECKER (Heidelberg). *The Anatomy of the Healthy and Morbid Lens.* J. F. Bergmann, Wiesbaden, 1883.

The author of the classical chapter on the Pathology and Therapy of the Lens-system in the Handbook of Graefe and Saemisch now supplements his former work on this subject by another of still greater importance, presenting the results of an extensive original research carried out by himself and his two assistants, J. R. da Gamo-Pinto and H. Schaefer.

The anatomical study of the lens in health has to encounter two special obstacles—the difficulty of obtaining a supply of specimens of the kind required, and the difficulty of making, in all the varying conditions of the lens, satisfactory microscopic sections. The former has been to a great extent removed by the free response given by many surgeons to Becker's appeal for pathological material, and the latter has been overcome by the devising, after many trials, of satisfactory methods of embedding, section-cutting, staining, etc. A summary of some of the results obtained has already appeared in our pages (*vide* O. R., vol. i., p. 417). The book now before us is of large quarto size. It consists of two hundred pages of printed matter, together with fourteen lithographed plates, containing altogether sixty-six drawings, the beauty and delicacy of which are of the very highest order. A few extracts from each chapter will give an idea of the scope and importance of the work.

Chapter I. Methods of Examination.—Teasing out the lens substance, and agitating it in Müller's fluid containing five per cent. of sulphuric acid, yield good isolated preparations, in which the endings of the fibres especially can be well seen. Changes in the capsule, and in the cells and fibres nearest to it,

may be studied in surface preparations made by laying the capsule flat upon the slide. To obtain these the lens, after having been partially hardened in Müller's fluid or in chromic acid for a few days, should be placed in absolute alcohol, which causes it to shrink, and then in diluted alcohol or water, the imbibition of which expands the capsule, so that it may be readily removed. The best staining agents are hæmatoxylin, either alone or in combination with eosin and alum-carmin; the latter is especially useful for the detection of nuclei in the fibres of old cataractous lenses.

The most important facts can only be observed by means of thin sections, and these can only be made with certainty after hardening and embedding. If alcohol be used for hardening, it must be a 60 or 65 per cent. solution; a weaker solution swells the lens, and a stronger one contracts it. In some cases it is well, before immersion in alcohol, to place the lenses for a few hours in a 0·25 per cent. of chromic acid. Generally speaking, however, Müller's fluid is the best hardening agent; its action is slower than that of the foregoing, but it has the advantage that the precise duration is unimportant, as lenses which have been immersed in it, even for many years, yield sections which, so far as regards the peripheral layers, are thoroughly satisfactory.

For embedding purposes two only, out of various substances tried, proved satisfactory—viz., the so-called Calberla mass, and a substance called celloidin. They adhere firmly to the capsule, so that this latter, together with its epithelium, and sometimes the peripheral fibre layers, will separate from the lens rather than from the embedding mass. The Calberla mass is made as follows:—The whites and yolks of fresh eggs are thoroughly beaten up, seven or eight drops of glycerine are added for each egg, and the whole is filtered through flannel. The specimen, fixed by pins in a paper cell, is surrounded and covered by this fluid; the whole is then exposed to alcohol vapour in a water-bath until the mass is solid, which requires, in the case of the half eyeball, about two hours; it is then further hardened in ordinary alcohol. Sections may be cut by hand, or the mass, fixed upon cork, may be placed in the microtome. The other embedding mass is a solution of celloidin in ether and alcohol, and is employed much in the same way as that above described. The Calberla mass permits

the making of finer sections, but has the disadvantage of becoming stained together with the specimen, while the celloidin mass remains unaffected by the staining agents.

Freezing is not mentioned. Has it any special disadvantage in relation to the lens? It is usually by far the readiest means both to section-cutting and to bisecting the eyeball.

Chapter II. Anatomy of the Healthy Lens.—1. *Development.*—In vertebrates the first trace of the lens occurs as a thickening of the ectoderm, which shortly—in man about the fourth week—becomes a closed sac with fluid contents, its wall consisting of several layers of epithelial cells. This constitutes the first period in its development. The second begins when the cells of the proximal wall of the sac grow forwards and arrange themselves as a series of fibres, the central being longer than those more laterally situated. At the same time the distal cells arrange themselves in a single layer—the layer which subsequently lines the anterior capsule, and provides the future fibres. This period is complete when the cavity of the lens-sac is filled with the proximal fibres—in man during the second month. The third period presents a further increase of cells and fibres; the latter are developed from the cells nearest to the equator, and as they are laid down they gradually separate the original proximal fibres from contact with the capsule behind, and with the capsular cells in front, so that they become completely surrounded, and form the centre of the lens. So soon as the original proximal fibres are thus everywhere surrounded by the fibres springing from cells at the equator the third period of development is at an end, and this happens about the middle of intra-uterine life. Thenceforward the lens *grows* by the laying down of successive layers of fibres.

The derivation of the lens-capsule is undetermined; some observers assert that it is formed from the mesoderm, others that it is a cuticular structure being formed from the cells of the original lens-sac. It is present from the beginning of the third period of the development of the lens.

11. *Growth.*—The intra-uterine growth of the lens, as contrasted with its development, begins at the moment when the original mass of fibres produced from the proximal cells is completely surrounded by equatorial fibres. These latter are then laid down in successive layers one over the other, each

fibre gradually elongating until it embraces the subjacent layer, and meets a fibre of the opposite side; the meeting of the fibres of opposite sides forms the stellate figure visible on the surfaces of the lens. The stellate figure is visible at the fifth month and is little altered at birth; soon after birth it becomes more complicated in arrangement.

In the second or extra-uterine period of growth, the same process of fibre-formation is continued, together with an opposing process, that of physiological degeneration.

In a foetal eye measuring 15mm. antero-posteriorly the lens weighed 0.07gr.; in the eye of a new-born child which measured 17mm. it weighed 0.10gr.; the average weight of the adult lens is stated at 0.218gr. (Sappey). During the extra-uterine growth the diameter increases from 5mm. to 10mm., while the axis undergoes but little lengthening, 4 or $4\frac{1}{2}$ mm. (Sappey). Priestley Smith's results are quoted as establishing a continuous increase of weight and volume with increasing age. A series of lenses which had been preserved for a length of time in Müller's fluid were weighed and measured by Becker, and presented an increase corresponding with the age of the individuals.

Appearances are sometimes discoverable in sections which show that the rate of growth of the layers is not always uniform. It is doubtless influenced by the general nutritive activity of the body, just as is the growth of the skin, the hair, and the nails, in the latter of which lines of arrested growth are frequently visible after febrile and other nutritive disturbances. It is reasonable to suppose that at a time when a child is well nourished and growing rapidly the new lens-fibres are larger and more succulent than they are during periods of emaciation and arrested growth. In the woody stems of plants the new rings are thicker in wet seasons than in dry. The evidence of such variations in the lens may be seen in the arrangement of the nuclei of successive fibre-layers; for a certain distance they will form an even line or curve, then one or more will stand in advance or in the rear of the rest, and sometimes the curve is broken and starts again further back.

Masses or planes of non-fibrillar substance, such as have been said to exist between the ends of the fibres where they meet in the radiating lines, have no existence except as the result of post-mortem change. Neither is there normally any

intermediate substance between the anterior epithelium and the capsule, or between the fibres and the posterior capsule ; but in the dead subject an albuminous fluid collects in these situations.

The layers multiply by the laying down of new fibres at the equator ; the most marginally situated of the epithelial cells lengthen out backwards in the direction of the posterior capsule to become fibres, and the cells which have already begun this process of conversion constantly increase in length as they are pushed away from the equator by the new comers. The constant transformation of cells into fibres implies a constant production of new cells ; a division of nuclei takes place throughout the whole epithelial layer, and the whole of the cells appear to travel gradually in a centrifugal direction over the inner surface of the capsule towards the equator—a process like that which has been found to occur in the epithelial lining of the cornea.

The following measurements (Ritter) show that the capsule grows with the lens :—

Lens of new-born Child measuring 5·5mm. in diameter.

Thickness of capsule at anterior pole	...	...	0·012mm.
“ “ at equator...	...	...	0·005 “
“ “ at posterior pole	...	...	0·0075 “

Lens of Adult measuring 10mm. in diameter.

Thickness of capsule at anterior pole	...	...	0·016mm.
“ “ at equator...	...	...	0·007 “
“ “ at posterior pole	...	...	0·008 “

In the new-born child Becker found that the capsule is thickest at a point immediately behind the posterior margin of Petit's canal.

III. *Physiological Degeneration.*—This process begins as early as the third period of the foetal development of the lens. The elements of the lens follow the same course as the cells of the cuticle and mucous membranes. The first formed of these latter cease to be nourished and loose their nuclei before the end of foetal life, and the early cells of the lens do the same ; but while the former are cast off, the latter are driven inwards, imprisoned, and compressed by the subsequently formed cells. The breadth of the fibres decreases from without inwards. The outermost fibres are smooth six-sided prisms, comparatively thick ; the deeper fibres have jagged or toothed edges fitting closely into the edges of their neighbours, a change due to shrinking.

As the cells increase in length on nearing the equator, the nuclei change the spherical for an elliptical form, and they

further increase in length as the cells are transformed into fibres. The nucleus begins to perish as soon as each end of the fibre has reached to one of the rays of the lens.

The physical changes which the fibres undergo with age consist of increased hardness, yellow discoloration, and increased refractive power. The epithelial cells become smaller, and their protoplasm shrinks. In some the nucleus becomes indistinct or vanishes entirely.

(*To be continued*).

Galezowski and Daguenet (Paris). **The Diagnosis and Treatment of Ocular Affections.** *Paris. Baillière et Fils, 1883.*

This is a new systematic treatise on diseases of the eye, in which special prominence is given to differential diagnosis and to treatment. It is to be issued in three parts. Part I., which is now before us, is an octavo volume of 300 well-printed pages, with woodcuts incorporated in the text. It deals with diseases of the conjunctiva, the cornea, the sclera, and the iris. Part II. will treat of the lens, the vitreous body, the choroid, the retina, and the optic nerve. Part III. is to be devoted to affections of the muscles, accommodation and refraction, diseases of the eyelids, lachrymal passages, and orbit, and will conclude with a consideration of injuries of the eye. The subscription price of the complete work is sixteen francs. The matter consists for the most part of clear expositions of well-established practice. Among novel modes of treatment we notice the employment of carbolic spray (1 per cent. solution) thrown upon the widely-opened eyes, as an auxiliary in the treatment of purulent conjunctivitis; the treatment of croupous conjunctivitis by an ointment of oil of cade and vaseline (1 to 10), or of iodoform and vaseline (2 or 3 to 10), introduced in small quantity between the eyelids five or six times in the day; the alternate use of atropine and eserine solutions in cases of episcleritis, a drop of atropine at night and a drop of eserine in the morning, "so as to keep off complications and yet to avoid disturbing the sight"; the excision of the diseased oculo-palpebral folds in obstinate cases of granular conjunctivitis (*vide* O. R., vol. i., p. 196), for which operation a special forceps with double extremities is recommended. A table, which we here translate, presents, side by side, in a convenient manner, the characters of the four chief diathetic forms of iritis:—

IRITIS.

SYPHILITIC.		RHEUMATIC.		GOUTY.		GONORRHOICAL.	
1.	Very frequent. Constitutes two-thirds of all cases of iritis.	1.	Constitutes fifteen per cent.	1.	Rather rare.	1.	Very rare.
2.	Occurs often immediately after the period of secondary affections.	2.	Occurs often after attacks of articular rheumatism or rheumatic pains.	2.	Begins often as a scleritis; occurs in persons subject to migraine, gravel, and gout.	2.	Begins during the period of discharge, with an attack of gonorrhoeal articular rheumatism.
3.	A plastic inflammation.	3.	Plastic, but sometimes serous.	3.	Plastic.	3.	Plastic and serous together.
4.	Onset irregular, but in the majority of cases indolent.	4.	Onset often violent, with crises of severe neuralgic pain.	4.	Same as in the rheumatic form, but sometimes runs a chronic course.	4.	Violent in its onset, but more rapid in its course than other forms of iritis.
5.	Posterior synechiæ more or less numerous. Pathognomonic signs: coexistence of other signs of syphilis, condylomata of the iris, other ocular lesions, such as retinitis, optic neuritis, paralysis of muscles. A coppery colour of the pupil-margin, and red patches resembling hamorrhages (really vessels) are signs of great value.	5.	Posterior synechiæ numerous, solid, difficult to break down.	5.	Same as in rheumatic form.	5.	Posterior synechia, not very solid, easily broken down, and reabsorbed. No form of iritis undergoes more complete cure, and leaves less trace.
6.	Surface of iris dull. Turbidity of aqueous humour. Punctate keratitis frequent.	6.	Surface of iris nearly normal in appearance. Usually no turbidity of aqueous, no punctate keratitis, no hypopion, no hyphema.	6.	The same as in the rheumatic form, but hypopion not infrequent—a pathognomonic sign when present. Often complicated with irido-cyclitis and opacity of lens.	6.	Aqueous often turbid; filled with fibrinous flocculi, which readily reabsorb.
7.	Recurrences frequent, and continually intensifying.	7.	Recurrences very frequent, sometimes in one eye, sometimes in the other, and often attributable to atmospheric changes.	7.	Recurrences frequent, but in constantly-diminishing intensity.	7.	Recurrences almost certain with each fresh attack of gonorrhoea.

TH. LEBER (Göttingen). Hydrocephalus with Post-neuritic Atrophy of the Optic Nerves, and Persistent Dropping of Watery Fluid from the Nostril. *Von Graefe's Archiv.*, XXIX., 1, p. 273.

Leber adds another to a group of peculiar cases recently noticed in this journal (O. R., vol. ii., p. 1—11), cases of persistent dropping of watery fluid from the nostril. He analyses the whole of the facts previously put on record, and concludes that in all probability the dropping represents an escape of cerebro-spinal fluid.

The patient, a girl, came first under notice in 1877, on account of failing vision; she was then 15½ years old. The following were the chief points in her previous history. Hydrocephalus from birth; always weakly and undersized, with large head; vision and intelligence good in childhood; had learned to read easily and well; vision good until about fifteen years old; during the last year great failure of vision; latterly, frequent short attacks of giddiness; occasionally, severe headache; two epileptic seizures. Patient's father and one brother said to have had unusually large heads; two other brothers and three sisters died in infancy.

Examination showed post-neuritic atrophy in both discs; vision reduced to counting fingers and seeing movements of hand; pupils active to light; stature small; horizontal circumference of head, 61 cm.; nasal catarrh, enlarged tonsils, coryza, indurated cervical glands, carious teeth. Iodide of potassium was given, and the patient returned to her home at a distance. It was reported that epileptic seizures recurred every six or eight weeks for a while, then gradually became less frequent; vision did not improve.

Dropping of fluid from the nose began in December, 1881, and in February, 1882, the patient presented herself again for examination. Vision had slightly deteriorated during the five years, one eye being now quite blind. Viscera normal; urine free from sugar and albumen; intelligence intact; no motor or sensory disturbances, except the loss of sight and complete loss of smell. When the head was bent forwards a watery fluid dropped constantly from the left nostril, when bent backwards and during sleep no discharge was observable—perhaps it passed into the throat; the dropping was more rapid in the

morning than in the afternoon; 76 cub. cm. escaped in six hours. The fluid had a specific gravity on one occasion of 1007, on another of 1008; it was perfectly clear and free from odour; gave no deposit on standing; contained a few lymph-corpuscles; contained a trace of some substance capable of reducing Fehling's solution (sugar 0.077 per cent?); a trace of albumen; chlorides and traces of sulphates; also traces of a fatty acid, in combination with an alkali. The dropping was observed during three weeks in hospital, and was afterwards reported to be still continuing at home. Occasionally it ceased for periods varying from eight days to four weeks. The patient's general condition continued better than in previous years; no pain or giddiness; convulsive seizures still occurred from time to time; they were not more apt to occur during the periods of arrested dropping than at other times.

The following is an abstract of Leber's analysis of the whole group of recorded cases—(Elliotson, Paget, Baxter, Nettleship, Priestley Smith. *Vide* O. R., vol. ii., p. 1—11).

In five cases the group of symptoms is almost completely similar:—Persistent dropping of a watery fluid from the nose, together with long continued severe brain-symptoms—such as violent pain in the head, epileptic attacks, vomiting, drowsiness, unconsciousness, delirium, weakness of the legs, and extreme impairment of vision in both eyes through neuritis or post-neuritic atrophy. In a sixth case also (Paget) there was violent pain in the head, and death occurred, with signs of meningitis a month after the dropping ceased.

In three cases loss of smell was noted; in the remainder the point is not mentioned. Cardiac palpitation and prominence of the eyes were observed in one instance (Nettleship); thyroid enlargement in another (Baxter).

What was the nature of the cerebral disorder? In Leber's case it was certainly an internal hydrocephalus, as shown by the shape of the head and the disturbance of development in childhood. The later cerebral symptoms, including the loss of smell, may be ascribed to a continuance of the disease after the skull had become hard and unyielding. A case reported by Quinke shows that loss of smell may be owing entirely to an excess of pressure within the skull. There was no evidence of the presence of a tumour. It appears probable that

hydrocephalus was present in the other cases also; not the ordinary hydrocephalus of childhood producing enlargement of the head, but a similar process beginning, or at least producing disturbance, only after consolidation of the bones of the skull. Thus in a case of von Graefe's, where descending neuritis due to basal meningitis was diagnosed during life, and no suspicion of hydrocephalus was entertained, post-mortem examination years afterwards revealed no trace of past meningitis and no tumour, but an extreme internal hydrocephalus with flattened corpora quadrigemina and simple atrophy of the optic nerves. Again in the case of a man who had suffered from attacks of vertigo, convulsions, headache, and vomiting, accompanied by gradual loss of sight, Förster found an extreme dropsical distension of the ventricles causing compression of the optic commissure and tracts. It is possible that many cases of optic-nerve atrophy, with deformity of the skull, belong to this category. In the cases now under discussion, the points in favour of hydrocephalus as compared with tumour are: the long duration of the disease; the absence of symptoms pointing to localised disease; the comparative youthfulness of the sufferers; the prominence of the forehead in one case; the absence of tumour and meningitis in the two cases examined after death; and the unusual density of the cranial bones in one of these.

The characters of the fluid distinguish it from a secretion of the nasal mucous membrane; it was perfectly clear, and in Leber's case contained no mucin until rendered impure by admixture with nasal secretion through the irritating presence of a catheter in the nostril; it contained no epithelial elements, and only a trace of albumen, and was secreted in too large amount to be a nasal secretion; in Elliotson's case, moreover, the patient suffered on several occasions from ordinary nasal catarrh producing a discharge from both nostrils, and the flow of the watery fluid was not affected thereby. The excoriated condition of the nostril and the presence of mucin in the fluid observed in other cases may well be regarded as secondary and non-essential conditions.

The presence of polypi in the nasal cavities in two cases is noteworthy, but Priestley Smith's suggestion that the discharge may be in some way dependent upon such formations appears

improbable, for while polypi are very common, the persistent dropping of fluid is extremely rare; in only two of the cases was there any evidence of polypi, while in five out of the six there were severe brain symptoms; the latter appear, therefore, to be the essential, the polypi an accidental complication.

A secretion so watery and so abundant is in all probability the product of a vascular organ specially adapted for secreting, such as the choroid plexus of the ventricles; wherever such villous structures are found there we find an abundant secretion of watery fluid free or almost free from albumen, *e.g.* the ciliary processes of the eye, and the glomeruli of the kidney. The specific gravity of the fluid was almost exactly alike in several of the cases, viz.: 1,007 to 1,008, and this corresponds closely with the ascertained specific gravity of cerebro-spinal fluid. The presence of a trace of albumen is another point of likeness. Some observers have found in cerebro-spinal fluid a trace of a copper-reducing substance probably allied to sugar, but in other cases this has been absent. In two of the cases in question this reaction was obtained on chemical analysis of the fluid, in the two others it was absent. This speaks rather in favour of than against its supposed cerebral origin. The amount of the fluid in the different cases shows a tolerable correspondence, though varying in all at different times; roughly estimated, the maximum discharge in the twenty-four hours may be placed on the average at about half a litre (about 18 ounces). Large amounts of cerebro-spinal fluid have been collected from the ear in cases of fractured base of the skull—in one case as much as 8 litres.

Again, it is highly significant that in two cases severe cerebral symptoms supervened on many occasions when the dropping stopped, and subsided when it was re-established; that in a third case death occurred a month after the dropping stopped; and that in a fourth, the patient's general condition was much better after the dropping made its appearance than before.

If the fluid be really cerebro-spinal how are we to explain the negative evidence with regard to this point in the two cases examined after death? The base of the skull was carefully examined in each, but no change capable of giving exit to the cerebro-spinal fluid was discovered. It appears that the

expectation was to find a carious condition of one or other bone at the base of the skull; but if a chronic hydrocephalus were at the root of the matter the outlet would probably be of a kind not easily detected with the naked eye. It may be supposed that an early defect existed in the bones at the base such as occurs not unfrequently in the skull-cap in hydrocephalus, and that the membrane originally covering it yielded after a time to the continued action of excessive pressure, the aperture being probably a very small one in the region of the sphenoid or ethmoid bones. In any future case it would be well to search for such an aperture by pouring a coloured fluid into the cavity of the skull. Seeing that a communication exists between the ventricles and the subarachnoid space it is not necessary to imagine an opening direct from the ventricles into the supposed defect in the bone, though it is not impossible that such might exist in the region of the tuber cinereum, which in cases of hydrocephalus is sometimes greatly distended.

Until the question is decided by further post-mortem observations the negative results obtained hitherto should not be allowed to outweigh the clinical evidence, which, in the author's opinion, points strongly to an escape of cerebro-spinal fluid.

S. SNELL (Sheffield). *The Electro-Magnet and its Employment in Ophthalmic Surgery.* London, Churchill, 1883.

In a small book of about one hundred pages Snell records his experience in the use of the electro-magnet, and brings in review the records of all the cases in which it has been used. He was among the first to employ the instrument in this country, and has had occasion to do so in an exceptionally large number of cases.

From the anterior chamber and lens Snell has extracted fragments in seven cases; in five of these good vision ($\frac{2}{40}$ or $\frac{2}{50}$) was recovered, and in the remaining two, which were recent at the time of writing, the prospect of good vision was entirely satisfactory. From the vitreous humour he has extracted fragments in eight cases; in two of these good vision ($\frac{2}{20}$ and $\frac{2}{50}$) was recovered;

the remaining six were cases which did not come immediately under notice, or presented disorganisation of the eye before the magnet was employed; but in five of them a presentable organ was retained, and in only one was enucleation resorted to. Two cases were met with in which the magnet failed to extract the foreign body, failure being due in the first to insufficient power in the magnet, and in the second to fixity of the fragment in the tunics.

The employment of a delicately poised magnetic needle as a means of diagnosing the presence of iron or steel within the eye, first proposed by Pooley of New York, though sometimes useful, was not uniformly trustworthy.

Special interest attaches to the contents of this book at the present moment, seeing that the electro-magnet is to be the subject of discussion in the Ophthalmic Section at the meeting to be held next month in Liverpool.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

ANNUAL GENERAL MEETING, JULY 6th, 1883.

WM. BOWMAN, F.R.S., President in the Chair.

Reported by DAWSON WILLIAMS, M.D.

The annual report of the Treasurer, Mr. J. F. Streatfeild, was read, and showed a satisfactory financial position.

The President, in reviewing the events of the third session of the Society, referred to the great loss experienced in the death of Mr. Critchett, and to the death of Mr. Lyell. Three members from the colonies or dependencies, and five from the United Kingdom, in addition to fourteen from London, had joined the Society.

Sympathetic Ophthalmia; Operation on the Exciting Eye; Recovery.—Mr. Simeon Snell.—A man, aged 36, ran a packing-needle into his *left* eye on October 5th. He came first under observation on October 20th; there was then prolapse of the iris, and a wound at the lower and inner sclero-corneal junction, encroaching on the ciliary region. On November 3rd the *right* eye presented plastic iritis, and this had been preceded by "mistiness" for two or three days; the pupil was hardly acted upon by atropine. On November 5th the condi-

tions were worse, and the next day still more aggravated. On November 6th the prolapse was incised, and as much iris as possible excised; very little was removed, and that only piecemeal, as it was incorporated in the tissues. The incision was prolonged on either side in the sclerotic, just behind the corneal junction (sclerotomy). The next day there was improvement in the sympathising eye; the pupil soon dilated, and the iritis subsided; the prolapse in the *left* had disappeared. On November 19th a little iritis appeared, and perchloride of mercury was ordered internally; recovery soon took place. In a few weeks he resumed his work. April 13th, 1883, V $\frac{2}{3}$ in either eye.

Hemichromatopsia.—Mr. Swanzy.—A gentleman, aged 77, had a slight attack of cerebral apoplexy, which rendered him unconscious for about twelve hours; he completely recovered in the course of a few days, except for some defect in vision, and a confusion of ideas when he made any unusual mental effort. He had not, even for a short time, any hemiplegia, affection of speech, or other paralysis. Five months later he consulted Mr. Swanzy on account of a difficulty in recognising his friends, even when near to them. In each eye, V. $\frac{6}{12}$; in the *left* eye a slight peripheral opacity of the lens; but, in all other respects, the eyes organically sound. This comparatively slight defect was insufficient to explain his difficulty in recognising people, and Mr. Swanzy was inclined to regard it as a disturbance of cerebral function. Examination with the perimeter displayed a slight homonymous defect in the right upper quadrant of each field. The patient complained that his colour-vision had not been so acute since the attack in November. He went through Holmgren's tests with accuracy, but the left side of the field in each eye was totally colour-blind, while, with the right side colours could be distinguished, although in an area concentrically contracted. This and similar cases showed that the nervous elements, in which the power of perception of colour resides, are situated in the brain, and not in the peripheral visual apparatus, and that the colour-centre in the brain is distinct from that for the form-sense, and for ordinary light-perception.

The President inquired whether the line limiting the field was quite vertical and through the fixation-point. One half of

the field for colour being lost, just as, in certain cerebral-lesions, one half of the field of ordinary vision was lost, it might be concluded that the loss in the colour-field was also due to cerebral lesion.

Mr. Brudenell Carter observed that there were cases on record which appeared to confirm the anatomical speculations of Mr. Swanzy. He had lately seen a case where, in the left eye, a colour-scotoma extended from the fixing-point ten degrees.

Mr. McHardy mentioned the case of a man who became suddenly colour-blind. About ten days before he came under observation he one day noticed that meat had a most "disgusting" slaty-blue colour, and he also, from that time, made mistakes in the colour of lights on board ship. He was found to be quite red-blind; he was suffering from albuminuria, and four days later died of cerebral apoplexy, which was found, at the necropsy, to be very extensive.

Mr. Swanzy said in reply that he had taken great care to test the centre of the field, because of the fact that in ordinary hemianopia the dividing line usually passed a few degrees to one side of the point of fixation. In this case the colour-scotoma, however, seemed to pass precisely through the centre.

Foreign Body in the Fundus.—Mr. J. E. Adams.—A young blacksmith was struck in the left eye by a chip from an anvil, which penetrated through the tissues and vitreous, and lodged in the fundus above, and to the outer side of the macula. For a few hours after the injury the patient could not distinguish light from darkness, but vision had steadily improved, and was now normal. The body was covered by remains of lymph and pigment, and there were some striæ, denoting the remains of hyalitis. A similar case had been recorded by Mr. Snell.

Mr. Snell said that in his case the foreign body entered a little beyond the sclero-corneal junction. Vision shortly after the accident was $\frac{2}{50}$, and subsequently reached J1. More recently he had seen a similar case in which the particle passed through the cornea and lens, and lay below the disc; at the end of two years the lens became opaque. Knapp had collected twelve cases, and had advised the use of the electro-magnet, but Mr. Snell felt great hesitation on the point.

Mr. W. Adams Frost said that he had seen a case in the practice of Mr. Waren Tay where the lens escaped injury and the media were clear; a glistening body could be seen close to the macula. Vision was fairly good, and there was no inflammation.

Ophthalmoscope for Artists.—Mr. J. E. Adams exhibited and described his ophthalmoscope for artists (*vide* O. R., vol. i., p. 186).

Mr. McHardy observed that, as artists were liable to a kind of cramp, from the strain and constant change from the ophthalmoscope to the pencil, the instrument was likely to be very useful.

Anomalous Distribution of Retinal Arteries.—Mr. J. B. Story read notes and showed a drawing of a case of anomalous distribution of the retinal arteries, where the superior nasal artery gave a branch which ran downwards in several curves, and ended in the descending division of the artery near the disc, without communicating directly with the central artery.

Mr. McHardy said that the appearance in the drawing resembled a case which he had seen; he thought it suggested aneurismal varix.

Congenital Drooping of the Left Upper Eyelid.—Mr. Gunn showed a girl, aged 15, in whom the left upper eyelid drooped, and the left pupil was contracted; associated with this was jerking action of the left levator palpebræ, the lid being retained in the raised position so long as the left external pterygoid acted on the jaw.

Dr. Cholmeley pointed out that the eyelid was materially lifted when the chin was turned quickly to the right. The case was subsequently referred to a committee, consisting of Mr. Gunn, Dr. Mackenzie, Dr. Abercrombie, and Mr. Lang.

Disseminated Choroido-Retinitis.—Mr. Symons showed for Mr. Lawson, a drawing from a case of choroido-retinitis in a man, aged 23 years, who had contracted syphilis thirty months earlier.

Morphæa.—Mr. Power exhibited a young woman, 23 years of age, with a patch of morphæa on the left upper eyelid.

Dr. Mackenzie thought that the patch would eventually disappear if left alone.

Cysticercus.—Mr. Hulke exhibited a drawing from a case of cysticercus in the vitreous humour; the child had subsequently passed under the care of Mr. Vernon, in St. Bartholomew's, and the case had been published by him elsewhere.

Multiple Retinal Aneurism.—Mr. A. H. Benson showed a drawing of a case in which there were numerous aneurisms on the arteries and veins of the retina. There was no increase of tension.

Facial, Conjunctival, and Retinal Nævus.—Dr. Horrocks exhibited a girl, 9 years of age, who had been subject to fits since her birth, and was hemiplegic on the left side. The right side of the face, including the skin of the eyelids and forehead, was covered with a nævus, giving a port-wine stain appearance; the conjunctiva was also affected. On ophthalmoscopic examination the retinal veins of the right eye were seen to be very tortuous. Owing to her defective intellect nothing satisfactory could be elicited as to vision; but, as far as could be made out, she saw equally and well. Dr. Horrocks pointed out that the tissues in which the vascular dilatation occurred were epiblastic structures, suggesting the possibility that the vessels of the pia mater on the right side were similarly affected, thereby having something to do with the left-sided fits.

Dr. S. Mackenzie observed that Dr. Allen Sturge had exhibited, at the Clinical Society, a case in which there was a nævus of one side of the face, and paralytic symptoms on the opposite side of the body, and argued that, possibly, a nævoid condition existed within the cranium at some part. Dr. Horrocks' case lent some support to that view, though it was proper to remember that the condition of the cerebral vessels had been met with on both sides without any symptoms.

Mr. Nettleship said that in Dr. Sturge's case there was nævus of the sclerotic also, and the affected eye was larger than the other. Dr. Horrocks suggested that in marked tortuosity of the retinal vessels the condition might be due to a foetal disturbance similar to that which set up cutaneous nævus.

Mr. Brundell Carter proposed a vote of thanks to Mr. William Bowman, the retiring President, whose devotion to the interests of the Society, and fostering care of it in its earliest days, could not be forgotten. He trusted that Mr. Bowman would still be able to attend its meetings. He desired to express to him, in the name of the Society, its grateful sense of the dignity and impartiality with which he had discharged the duties of his office. The motion was carried by acclamation.

Mr. Bowman, in acknowledging the vote of thanks, referred to the time when he had first began to turn his attention to the subjects which now interested the Ophthalmological Society. Knowledge of the structures and of the functions of the eye was then imperfect and elementary, and treatment most inadequate. The subject had hardly ceased to be dealt with either on the most general lines, or as a narrow specialty. Now, the condition of things was widely different ; no department of medicine had known more splendid progress. It had been a pleasure to him, through many past years, to follow this advance, and perhaps, in some small part, to promote it ; particularly pleasant to him had it been, as their first President, to take part in the happily conceived idea of bringing together those engaged in ophthalmic practice, and the kindred side of the medical art throughout the United Kingdom, its great colonies and dependencies. He could claim but a very small share in the work of the Society ; the credit of its success rather belonged to those who first initiated it, particularly to the first two secretaries, Dr. Stephen Mackenzie and Mr. Nettleship, and to all those gentlemen, especially on the medical side, who had co-operated with them. The Society had brought into union those who studied eye disease as physicians, and those engaged in the special practice of ophthalmology, and proved the necessity for studying the eye in the light of its relation to the whole organism, as well as in view of that wider relationship which it bears to all organic life upon the globe. He trusted that the Society would always continue, in the interest of medicine at large, to hold up ophthalmology as that department of the medical art in which exact knowledge was most attainable, and its application to the prevention and alleviation of disease best exemplified.

CORRESPONDENCE.

Trichiasis Operations.—Since the publication of my article upon this subject in the February number of the Review, I have received several reports of Dr. E. van Millingen's Eye Hospital, in Constantinople, from which I think it right to publish the following extracts. They are taken from the report for 1877-78 and '79.

“For trichiasis or distichiasis of the upper lid, without incurvation, I practise either the Arlt-Jaesche operation, or else a modification of this operation, which I have tried with perfect success, and can recommend as more certain in its results, and the only means of averting a relapse, which, after the Arlt-Jaesche operation, is very frequent. The modification consists in transplanting a small strip of skin, or, better still, mucous membrane on to the space between the ciliæ and conjunctiva; this is done after the first act of Arlt-Jaesche's operation is completed, and the strip of skin or membrane is left there without applying any sutures. It may be covered over with a piece of goldbeaters' skin, and the whole secured by a bandage. It is well to secure a broad gap at the intermarginal space before transplanting the strip of skin, and this is done by drawing up the cutis of the upper lid against the forehead by means of sutures, which ought to be left until the strip has taken, which generally occurs in twenty-four hours. I take this strip from the upper eyelid if the skin is found to be hairless after examination with a magnifying glass. As this is rarely the case, it is better to use membrane. I have transplanted the under lip of the rabbit with success. The strip of mucous membrane must be adapted on the raw surface as soon as the bleeding has ceased. It is not necessary to apply any sutures. . . . In my report I have designated the above operation as a modification of Arlt's operation. Under the name of Watson's and my operation I shall describe a method by which I have succeeded in curing a number of cases of trichiasis, which Arlt's and other operations had failed to cure. I have practised it since 1872, but Watson (Ophth. Hosp. Report, vii., p. 440) was the first to describe it.”

Dr. Millingen concludes by asserting that the reobliteration of the intermarginal space is the cause of the relapse of trichiasis after Arlt's operation, and the only safeguard against this is the interposition of other tissue between the cilia and the conjunctiva, the best tissue being the upper lid or under lip of the rabbit. Though Dr. Millingen makes no claim to priority for his particular method, I think these extracts should be published, for they prove that for many years back he has recognised the importance of supplying support to the ciliary flap from below, in order to prevent the recurrence of the deformity after transplantation. This is the principle that Spencer Watson was the first to adopt, and which Dianoux's operation most completely carries out. Possibly in difficult cases, and when the palpebral skin is hairy, Dr. Millingen's method of transplanting rabbits' mucous membrane will be found the most satisfactory. Up to this I have only seen one case where any trouble has

been caused by the hairs on the transplanted cutis, but the misfortune may occur more frequently than the series of cases I have seen would lead me to suppose, and I shall certainly adopt Dr. Millingen's suggestion when a suitable case presents itself.

JOHN B. STORY.

Dublin, 16th July, 1883.

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LATERAL DISLOCATION OF THE LENS WITH SECONDARY GLAUCOMA: PATHOLOGY.

BY PRIESTLEY SMITH.

Dislocation of the lens has long been recognised as one of the conditions which is apt to lead to secondary glaucoma, but the precise manner in which the increase of tension is brought about by such an accident is still to some extent a matter of conjecture. In a former paper (*O. R.*, vol i., p. 209) I described a case of spontaneous dislocation of the lens into the anterior chamber, and discussed the pathology of the glaucomatous complication which ensued. I am now able to do the same with regard to a traumatic lateral dislocation.

John B. (*K.* 344), aged 59, a baker, came to the accident room of the Queen's Hospital late at night on *August 12th*, 1882. He had been knocked down and kicked on the head and face a few minutes previously by a companion in a drunken brawl. When examined the next morning by Mr. Jordan Lloyd (at that time Casualty Surgeon, now Surgeon to the Hospital), he had a scalp wound, and a contused wound of the right cheek and eyebrow, with much swelling of the eyelids, an injury such as would be inflicted by a kick across the eye as he lay on the ground. Three days later, when the lids could be separated, vision was found to be impaired. Rather severe pain in the eye came on a day or two after the accident, and increased from day to day. Mr. Lloyd found the tension to be much increased, and brought the man to the Eye Department for further examination on the sixth day after the accident.

August 18th.—*Right eye:* Hm. about $\frac{1}{30}$; V $\frac{8}{200}$; T + 2 or 3; field, roughly tested by hand, normal; superficial vessels injected; cornea hazy; pupil somewhat dilated, and imperfectly circular, the dilatation affecting chiefly the upper-inner side;

iris not noticeably tremulous; lens clear, displaced outwards and slightly downwards, its inner-upper margin being just visible with the ophthalmoscope, within the margin of the pupil where most dilated; fundus oculi not clearly visible. Fig. 1, taken from a sketch made in the case book at the time of examination, shows approximately the form and position of the pupil, and the displacement of the lens. The pupil was less dilated at the outer-lower side than elsewhere, its margin at this part being too straight, and forming something like a chord to the remainder of the circle. The corresponding portion of the iris presented a flatter surface than usual, and near to the periphery appeared to be in contact with the cornea.



Fig. 1. Diagrammatic.

From the visible displacement of the parts there could be no doubt that the hidden side of the lens lay behind the ciliary processes, and that these latter were pushing forwards the corresponding portion of the iris. This compression of the angle of the anterior chamber throughout at least a third of the circle afforded a reasonable explanation of the high tension, and it seemed not unlikely that contraction of the pupil by eserine would give relief. Two eserine discs were inserted. Re-examined about an hour later by Mr. Lloyd and myself, the eye presented a striking change. The pupil was contracted to about 2 mm., circular, but still excentric as before; *the tension had fallen completely to the normal*; the pain was gone. The patient was admitted to the wards.

The same evening, five hours later, the pupil was still contracted, and the tension remained normal.

August 19th.—Pain returned in the night. The pupil now rather larger than last evening; T+2.

During the next three weeks I was away from Birmingham. The patient remained in Hospital under Mr. Lloyd's observation. Eserine drops, 1 grain to 1 ounce, were used once daily for a week, and then discontinued as they caused pain and did not again effect a noticeable reduction of tension.

September 15th.— $V = \frac{8}{200}$; $T + 2$; pupil medium size, and excentric as before; on oblique inspection with ophthalmoscope, edge of lens just visible behind inner margin of pupil; pain slight.

For some weeks after this a weaker eserine solution was employed with some slight benefit; T varied slightly, but remained persistently in excess; V rose for a time to $\frac{20}{200}$, and on one occasion to $\frac{20}{100}$; pain remained unimportant. An attempt was made on several occasions to effect some improvement in the position of the lens by massage of the ciliary region, but without success. Iridectomy was advised, but declined by the patient; it was not strongly urged, as success was very doubtful.

November 21st.—Very severe pain the last few days; $T + 2$; increased injection of ciliary region. Patient now begged for any operation which would relieve his pain. Quinine and morphia were given, and eserine was again applied locally, but effected hardly any change in the size of the pupil, and no lowering of tension, and no relief of pain. I determined to perform iridectomy, but warned the patient that success was uncertain, and that immediate excision might prove necessary.

November 24th (fourteen weeks after the accident).—Twenty grains of chloral by the mouth, in order, if possible, to prevent sickness, and half an hour later ether inhalation in the usual way. Iridectomy upwards, the incision being made with the Graefe knife, and a broad piece of iris being removed without visible incarceration at the angles of the wound; there was apparently no escape of vitreous fluid; the lens, a large portion of the upper edge of which was now visible in the coloboma, showed no disposition to change its place; the tension was thoroughly reduced. A few minutes later, with the return of consciousness, retching and straining began; a large soft pad of cotton wool was held over the eye, but almost immediately the patient cried out with violent pain in the eye. The pad being removed, a large quantity of fluid vitreous was found in the hollow of the orbit external to the lids; the globe felt full; no escape of blood, but manifestly a profuse internal hæmorrhage; excision.

Examination of Specimen.—After excision, the globe was somewhat collapsed, cornea and sclera both falling inwards. In order to restore its shape as far as possible I gently injected a few drops of oil into the anterior chamber through the large iridectomy wound, and thereby raised the collapsed cornea somewhat; and then passing the needle of the syringe through the sclera near the optic nerve, I injected a small quantity of oil into the hinder part of the globe, so that, as the specimen lay in Müller's fluid, the depression in the sclera was nearly removed; in presence of the large opening into the anterior chamber and the escaping vitreous it was of course impossible to restore anything approaching to a normal tension.

After immersion in Müller's fluid for six or seven weeks, the globe was frozen solid and bisected in the direction indicated by the oblique line in Figure 1, so as to divide the lens as equally as possible and in the direction of its displacement, and to keep clear of the iridectomy.

Figure 2 shows the anterior part of one hemisphere drawn and copied in the manner described in a former paper (O. R., vol. ii., p. 72). The right and left sides are reversed as compared with Figure 1. A large mass of blood lies between the

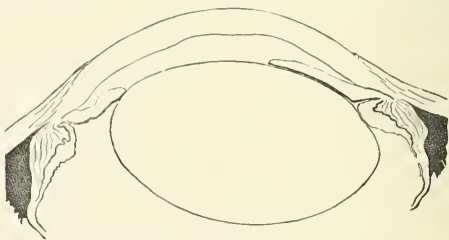


Fig. 2. Magnified 5 Diameters.

sclera and the choroid, pushing the latter, together with the retina, towards the axis of the eye; not more than a fourth at most of the vitreous remains. The lens measures 9.75mm. transversely, 5.75mm. axially. At the side towards which it is displaced—the right side in Figure 2—it remains to some extent attached and fixed, while its opposite edge

swings loose and unattached; when the unattached edge is brought gently forwards till it touches the iris — the position which it appeared to occupy during life — it assumes the position shown in the drawing. At the attached side (right), the equator of the lens lies *behind* the ciliary processes; about 1.5 mm. in front of the equator the anterior surface shows a slight but distinct impression, corresponding with the outline of the processes; the processes and iris are closely moulded against the lens, and against each other, as shown in the figure, but are not adherent; the small triangular space which intervenes where the three surfaces meet is filled by a three-cornered mass, apparently consisting of a coagulated exudation; the angle of the anterior chamber is closed for a considerable distance, and at the ligamentum pectinatum the surfaces appear to be slightly adherent; the distance to which the contact of the iris and cornea existed during life cannot be determined with precision from the specimen in its present condition, as the position of the parts must have been disturbed by the opening of the anterior chamber and the escape of vitreous. At the other side of the circle (left) the processes are widely separated from the lens-margins, and have not the wedge-like form which they have at the right side, where they are compressed by the lens; here, also however, they bear against the base of the iris, and this latter is pushed forward so as to close the angle of the anterior chamber. The displacement of the ciliary muscle by the intrusion of blood between it and the sclera, which happened immediately before excision, has perhaps contributed here to the compression of the iris-base by tilting the processes forward. The optic disc is rather deeply excavated, but not fully up to the margin.

Thin sections were taken from the ciliary region in various parts of the circle. Figure 3 represents one of these from the part pressed upon by the lens. The iris has fallen away a little from the cornea, and in like manner the apex of the process has separated from the iris, through the removal of the pressure from behind. Projecting in advance of the process and attached to it is a forked shred of coagulated exudation; a similar shred is to be seen in many other sections; it serves to indicate the point to which the apex of the process reached

when turgid with blood. In the iris are many dilated and tortuous vessels. There are probably some inflammatory or proliferative changes in the ciliary muscle and in the tissues



Fig. 3. Magnified nearly 20 Diameters.

adjacent to the angle of the anterior chamber and Schlemm's canal, but the difference between these tissues and those in sections from a healthy eye is not very decided. The most obvious tissue change is a disturbance of the iris pigment. Large, densely black, globular cells are scattered about throughout the whole thickness of the iris, and at the base of the iris where it is in contact with the ciliary processes a free proliferation of these cells seems to have taken place; they extend in a crowd through the base of the iris towards the compressed angle of the chamber, while a few smaller pigment-masses have passed through the ligamentum pectinatum and reached Schlemm's canal. In some sections Schlemm's canal is partly filled with blood corpuscles. Sections through the region of the iridectomy incision show that the latter lies nearly 1 mm. in advance of Schlemm's canal and, internally, entirely in corneal tissue; the iris is less cleanly excised than one would have supposed from the satisfactory appearance at the time of the operation, for a considerable stump remains, shreds of which in some sections lap round the lip of the wound.

Glaucomatous tension following a dislocation of the lens, such as that here described, was formerly attributed to a process of irritative hypersecretion. Thus Hermann

Schmidt, in his article on Glaucoma (*Graefe-Saemisch*, vol. v., p. 42), says that the lens-dislocations which induce glaucoma "are rather those slight displacements and simple oscillations of the lens which excite hypersecretion by irritating the iris or dragging on the ciliary processes, than the more complete dislocations, movable or immovable—although these also lead to secondary glaucoma in a considerable number of cases." And Becker, in his chapter on the diseases of the lens (*Graefe-Saemisch*, vol. v., p. 295), says, speaking of partial dislocation, "The considerable oscillations which the lens makes with every movement of the head and eyes must cause a continual dragging upon the unruptured portion of the zonula. In this way cyclitis, choroiditis, and glaucoma may ultimately arise."

For the case now before us this pathology is evidently at fault. The lens was to all appearance firmly fixed in its new position and made no oscillations whatever, and the high tension which came on within a day or two of the accident, if not earlier, was entirely removed for the time being by a single application of eserine.

The discoveries of Leber, Adolph Weber, and Max Knies have taught us of late years to look for changes of an obstructive nature before we refer a glaucomatous tension to hypersecretion. In 1878 I expressed the opinion that "partial dislocations of the lens induce glaucomatous complications by reason of the direct pressure of the periphery of the lens against the periphery of the iris throughout that portion of the circle towards which the lens is displaced, and consequent closure of the angle of the anterior chamber in this situation" (*Glaucoma, its causes, etc.*, 1879, p. 183), but until now no opportunity of examining such a case anatomically has presented itself to me. Dissection now shows that though the principle was right, the idea of a direct pressure of the lens-margin upon the iris was

wrong ; the ciliary processes necessarily intervene. There are three points in the case which, taken in conjunction, clearly prove, I think, that the immediate and essential cause of the glaucoma was a mechanical obstruction :—

First. The visible pushing forwards of the iris at the side towards which the lens was displaced.—A case occurred in my practice not long ago in which an obstructive change very similar in character, and equally productive of very high tension, was brought about in a different manner.

Mary B. (K. 68), aged 43, with cataract, resembling ordinary senile cataract, in both eyes, underwent preliminary iridectomy upwards in both eyes on *March 17, 1882*. The ether produced intense congestion of head and neck, and there was some struggling, but a good clean iridectomy was made in both eyes without apparent mishap. Atropine was instilled. The knife employed was a bent keratome, with edges parallel except near the point, 4 mm. broad.

March 19th.—Severe pain in left eye began last night, and lasted nearly all night. This morning pain continues ; capsule of lens is ruptured in a vertical line right across pupil (? wounded at operation) ; in outer half of pupillary area lens appears devoid of capsule and protrudes in advance of inner half, which is still enclosed in capsule : iris pushed against cornea throughout the outer $\frac{1}{2}$ or $\frac{1}{3}$ of the circle ; pupil very widely dilated ; iridectomy wound seems soundly healed ; T + 2 ; no ciliary injection.

March 20th.—Conditions little altered ; some ciliary injection to-day. Hot fomentations employed yesterday gave little relief ; morphia at night gave rather more. T + 2 continues.

March 21st.—Chloroform followed up by ether. Extraction of lens in usual way without regard to iridectomy wound, and without any mishap. Severe pain came on two hours later, but was at once removed by two leeches. After that an uninterrupted good recovery. T n ; with $3\frac{1}{2}$ convex V = $\frac{20}{70}$; slight capsular film.

There is nothing extraordinary in this case ; I cite it merely as an instance of very high tension rapidly

induced by the pushing forward of one half of the iris against the cornea, and immediately reduced by the removal of the offending lens.

Second. The complete reduction of the tension which ensued within an hour of the application of eserine to the eye.—The only feasible explanation of this effect is a reopening of a closed outlet for the pent-up fluid, and the only conditions, so far as I know, in which eserine has such a power, are just those in which the outlet is closed by a displacement of the iris, reducible by contraction of the pupil (*vide* O. R., vol. i., p. 78).

Third. The position of the lens, processes, and iris, revealed by dissection.—It is not clear at first sight why the lens, though torn from its attachments on the one side should press forcibly upon the processes at the opposite side. It would be drawn towards these latter by the elasticity of the unbroken suspensory ligament; but why should it drive them forwards or compress them? If the lens were suspended in fluid merely it could do so only by reason of a momentum imparted to it by movements of the eye or head; if, however, it rested posteriorly against a consistent cushion its pressure on the processes is readily explained. A vitreous body of normal consistence, or even a fluid vitreous, provided it be retained within its limiting membrane, affords such a cushion. From the fact that in the present instance the iris was not noticeably tremulous, that the lens did not alter its position during several months, and that no vitreous fluid escaped until after the iridectomy was safely completed and the eyelids closed, it is probable, I think, that the hyaloid membrane was actually unruptured until the moment when a profuse hæmorrhage from the choroid forced the vitreous through it. The mechanism of the dislocation may be pictured thus:—A blunt object, the toe of a boot, striking violently on the eye, compresses it antero-posteriorly, and expands it equatorially; the suspensory ligament, thus thrown into excessive tension, gives way at the one side, and there-

upon the unruptured portion pulls the lens strongly over to the other side, wedging it in, as it were, between the contiguous surfaces of the ciliary processes and the vitreous; here it remains permanently fixed, and compresses the processes and iris in the manner exhibited in the figures.

The condition of the angle of the anterior chamber at the opposite side of the circle (left side in Figure 2) previous to the operation unfortunately remains uncertain. In the excised globe it is in all sections found to be closed by pressure of the processes upon the iris-base, but I cannot decide whether or to what extent this may have been caused by the tilting forward of the whole ciliary body by the blood extravasated just before excision. From the appearance of the parts the probability is, I think, that the closure occurred before the displacement of the ciliary body as a whole. I think it not unlikely that the vitreous body, being encroached upon and displaced at the one side by the intrusion of the lens, would advance at the other side into the space left free by the lens in such a way as to push forward the processes and iris-base; this, however, is hypothesis only.

While asserting the obstructive origin of the high tension in the present case, I do not deny that inflammation and perverted secretion may also play a part in such glaucomatous conditions. There were doubtless some slight inflammatory changes in this eye, and these in process of time would very probably have sealed up the outlet of the anterior chamber by solid adhesions, and there were traces of an albuminous secretion from the ciliary processes. Perhaps it was owing to such changes that eserine soon lost its power of contracting the pupil and reducing the tension. With regard to hypersecretion it cannot, I think, be conceived that fluid can flow in increased quantity into an eyeball the outlets of which are obstructed.

One other point deserves notice, namely, the remarkable pigment disturbance at the base of the iris (see Figure 3, p. 262). Though I have not hitherto noted this appearance, I find, on looking through my collection, that it is present in some degree in a good many of the glaucoma sections. In some of the sections made across the ciliary processes so as to show the base of the iris and a number of the processes in transverse section beneath it, there is a distinct migration of pigment cells into the substance of the iris just where the processes bear against its uveal surface. In many meridional sections there is also a considerable quantity of pigment débris in the meshes of the ligamentum pectinatum close to Schlemm's canal—an appearance not observable to anything like the same extent in sections from healthy eyes. These changes seem to suggest that when the iris becomes applied to the ligamentum pectinatum so as to act as a barrier to the normal filtration, its own constituents tend to be drawn or forced into the obstructed outlet; one may picture the condition by comparing it with what would happen in the case of a cloth laid over the sieve-like outlet of a cistern. In the present instance the cells seem, in some sections, to pass along definite lines or sinuses leading towards the angle of the anterior chamber. "The iris has no lymphatic vessels in the ordinary sense, but there exist lymphatic sinuses in the sheath of the blood vessels, especially of the arteries, and between the trabeculæ of the connective tissue bundles; at the ciliary margin of the iris they open into the spaces of Fontana, and into those of the ligamentum pectinatum" (Atlas of Histology, by E. Klein and E. Noble Smith, p. 352).

From observations made after injections of fluid into the eyes of living animals, Ulrich concludes that there is normally a stream of fluid passing forwards through the base of the iris, and that it is by this path, *and not through the pupil*, that fluid normally passes from the posterior to the anterior chamber (Von Graefe's Archiv.

xxvi., 3, p. 35). That this should be the main channel for the intraocular fluid in presence of an open pupil is opposed to all physical considerations, and we know that when the pupil becomes occluded fluid is usually imprisoned in the posterior chamber. Klein's statement concerning the lymphatic sinuses at the base of the iris shows, nevertheless, that there is a lymph-current in this situation, and it is reasonable to suppose that when the base of the iris is applied to the ligamentum pectinatum, and the intraocular pressure rises, an additional flow may find its way along these channels, and that the living elements of the iris itself may migrate in the same direction. It is easy, as my own experiments have shown, to close the angle of the anterior chamber by injection of fluid into the vitreous chamber, and it must be noted that it was only after injections into the eyeball, and not after systemic injections, that Ulrich could trace the passage of the injected fluid through the base of the iris.

The treatment adopted in this case was unsuccessful. Seeing that heavy drinkers almost always take anæsthetics badly, and that retching was the complication chiefly to be feared, and was, as it proved, the immediate cause of the eye being lost, it might have been better to attempt the operation without an anæsthetic; perhaps to perform sclerotomy rather than iridectomy. Any attempt to extract the lens would, I think, certainly have destroyed the eye, but it is just possible that the glaucomatous condition might have been relieved early in the course of the disorder by completing the dislocation of the lens—pushing it backwards into the vitreous and so relieving the direct pressure upon the ciliary processes.



Fig. 46

Fig. 47



Fig. 48

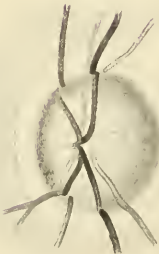


Fig. 49 — x indicates the direction in which the yellow aneurysm is located.



OTTO BECKER. The Anatomy of the Healthy and Morbid Lens.

(Continued from page 240.)

Chapter III. Anatomy of the Morbid Lens. 1. *Changes in the Lens-substance.* A. *Senile cataract.*—In senile cataract are to be met with all the morbid changes which occur in other varieties of cataract; they may be classed under two chief heads: the retrograde metamorphosis, and the regenerative or so-called atrophic cell-growth which retrograde metamorphosis calls forth.

The beginning of senile cataract is marked (Förster) by an abnormal differentiation into a clear yellow nucleus and a clear colourless cortical layer, the two being separated at the equator by a sharp, fine line of demarcation. Simultaneously and in causal relation with this demarcation, opacities form on the surface of the nucleus in a narrow zone just in front of and just behind the equator. They appear in four chief varieties:—1. Short white striæ embracing the equator in the form of interrupted lines. 2. Thin white flakes either embracing the equator without interruption, or appearing in isolated parts in front of and behind it. 3. White striæ traversing the surface of the nucleus in a meridional direction, broadest at the equator, tapering towards the poles. 4. Nebulous opacities without defined contour, forming a delicate belt around the whole periphery of the nucleus.

The further development of the cataract consists in the spread of the above-named opacities, especially the striæ, over the surface of the nucleus, and ultimately throughout the whole thickness of the cortex; at the same time small grey spots form between the striæ. At first the volume of the lens increases, as shown by the shallower anterior chamber, in consequence of an increased absorption of water, and the faster the cortex opacifies the quicker is the increase of volume; when opacity of the cortex is complete the excess of water is again given up and shrinking commences. According to Arlt, the time at which a cataract is ripe is when it has thus returned to its normal volume; at that point the period of over-ripeness begins. (In a subsequent passage Becker points out that this alleged enlargement is at variance with the most recent observations, according to which it appears that the gradually

opacifying senile lens is usually smaller than a healthy lens of the same age.) The over-ripening is characterised by the formation of white punctate and linear opacities on the inner surface of the anterior capsule, and by the disappearance of the stellate arrangement of fibres. Ultimately the cortical substance degenerates more and more, sometimes with formation of capsular cataract, and sometimes being converted into a liquid pulp in which the nucleus sinks to the bottom (Morgagnian cataract). In opposition to Förster, who asserts that when the cortical opacity has reached a certain stage the nucleus becomes diffusely clouded also, Becker believes that the nucleus often remains clear.

In senile cataract the formation of spaces and clefts between the fibres, without actual opacity, always precedes the occurrence of real opacity. When, as occasionally happens, the process begins in the anterior or posterior cortex, we are able to observe this splitting of the layers, for a visual disturbance is produced which induces the patient to seek advice ; usually, however, it begins at the periphery, and goes on unobserved. Where one eye is already cataractous the other eye, examined with dilated pupil, will generally show such changes at the periphery of the lens. The proof that the fluid in the interspaces is in the first instance clear is found in the fact that, on varying the direction of the light from the ophthalmoscope, we see at one moment a dark line, at another, none ; this can only be due to the fact that there are portions of the lens which, although transparent, possess a different refractive index from that of the adjacent lens matter. The phenomenon is one of total reflection.

The fluid filling the interspaces is, in the first instance, simply that which is present in small amount, in the normal lens, as in all other living tissues ; its existence is established by the nutrition experiments of Ulrich, Arnold, and Bence Jones. A disturbance in the normal shrinking process of the lens-fibres causes the peripheral layers to separate more or less from each other, and the normal nutrient fluid collects in extra quantity in the interspaces ; abnormal diffusion processes are then set up between this stagnant fluid and the contents of the fibres, and thence follows the disturbance of nutrition which leads on to further changes in the fibres. This explanation of

the first stage of the cataractous process receives fresh support from the observations of Priestley Smith, according to which it seems likely that a period of diminished rate of growth precedes the formation of opacity. We may assume that, before the separation of the fibre-layers takes place, there has already been an excess in the process of physiological degeneration.

The fluid exuded into the interspaces between the separated fibre-layers often coagulates in small masses in such a way as to present under the microscope the appearance of a transversely striated fibre, or of one of the many-celled algæ. In a former work Becker ascribed this change to coagulation within the body of a fibre, but has now ascertained that it takes place in the interspaces. Whether the peculiar transverse divisions of the coagulated fluid form during life or only as the result of hardening agents remains uncertain. The further stages of cataractous degeneration consist in the displacement of the layers, the breaking up of the individual fibres into a molecular mass, and sometimes the formation of calcareous and fatty deposits. These various conditions are admirably portrayed in the plates.

B. *Juvenile Cataract*.—The spontaneous occurrence of total cataract in the youthful lens can not yet be accounted for. Examination of a soft cataract from a diabetic girl, aged 19, showed that the opacity was due to a separation of the fibre-layers, and the collection of fluid between them. The same structural changes are present in traumatic cataract. In the latter case fluid gains access to the lens-substance in the first instance, directly through the opening in the capsule; but seeing that the cataractous process may continue after the opening has healed, it would appear that the abnormal presence of fluid amongst the layers may lead on to a further abnormal absorption and interchange of fluid through the capsule itself. In the case of diabetic cataract it must be assumed that abnormal absorption of this kind occurs spontaneously.

In consecutive cataract also the opacity is produced by separation of the fibre-layers, and here it appears that the tendency to such separation is caused by the action of a morbidly altered nutrient fluid. The absorption of fluid in abnormal quantity through the capsule, which causes swelling up of the lens, is a secondary stage of the morbid process both in youthful and in senile cataract.

2. *Changes in the Intracapsular Cells. Capsular Cataract.*

A. *Degeneration.*—The degenerative changes which affect the capsular epithelium are sharply distinguishable from the physiological degeneration of lens-fibres already described. While this latter consists in a simple atrophy of the nuclei and cells, the other comprises a transformation, first of the nuclei and then of the entire cell, into a pathological substance, the chemical nature of which is not accurately known. The process resembles that by which the colloid masses are formed (*drusenbildung*) on the inner surface of the choroid. The new substance is found in a film or in isolated masses, having either a flattened or globular contour, as seen in profile on the inner surface of the capsule. It is transparent, like the capsule itself, and of high refractive power. These transparent, globular and flattened masses occasionally contain strongly staining nuclei, and they are invariably surrounded by cells containing nuclei. They are to be found in almost every senile cataract of long duration, and correspond clinically to the strongly reflecting white points, which are usually visible on the inner surface of over-ripe cataracts.

B. *New Cell Formation.*—Apart from the cell-proliferation immediately around the colloid masses, a formation of new cells takes place within the capsule in every case of senile cataract. It may occur without lenticular cataract, and is therefore neither a cause nor a consequence of this latter; both probably own a common cause—the shrinking of the sclerosing lens-fibres.

New cells within an unbroken capsule are in all cases the progeny of cells normally existent there; they spring from the capsular epithelium, from the cells undergoing transformation into fibres at the vortex (*wirbel*), and perhaps also from already formed fibres in this neighbourhood. As the result of this fresh cell-growth arising from atrophy, we find an epithelioid lining to the posterior capsule, large bladder-like cells nested together in the anterior and posterior cortex, as well as at the equator, and the colloid formations already described.

A growth of new cells on the inner surface of the posterior capsule, where in the healthy fully-developed eye no such cells exist, was observed 12 times among 38 lenses which were extracted in their capsules and sent for examination by

Pagenstecher. The large bladder-like cells are found in senile cataracts at all stages and also in diabetic and congenital cataracts.

Capsular cataract occurs congenitally and at every period of life. It originates in the proliferation of one or more of the intra-capsular cells which, enlarging and multiplying, force themselves in between the capsule and the neighbouring normal epithelial cells, raising these latter more and more as new cells and layers of intercellular substance are formed beneath them. In section the new formation presents a lamellar structure, and somewhat resembles corneal tissue in appearance; its inner surface is covered over to a certain distance, perhaps sometimes covered throughout, by the separated epithelial lining of the capsule. Between the epithelial layer and the new formation there is, however, very frequently a thin structureless membrane, which passes at its edges into the capsule itself, and is evidently a thin lamina split off from it by the intrusion of the new material into its substance. It seems that the epithelial cells, in which the morbid growth begins, damage the capsule in some way, so that their offshoots penetrate into its substance, and as they extend, split it up into an inner and an outer layer, the inner layer carrying the normal epithelial lining on its inner surface.

Some authors describe capsular cataracts as enclosing substances essentially foreign to the lens. Becker finds chalk-concretions, occasionally cholesterine crystals, and the so-called colloid substance, but nothing which could not be formed by degeneration of the cells and fibres of the normal lens. The question of chief interest concerns the alleged presence of masses of connective tissue. Leber arrived at the conclusion, from a study of experimentally produced cataracts, that a tissue closely resembling the connective-tissue type may be formed from the lens elements—*i.e.*, from tissue of the epithelial type, and asks whether and in what respect, chemically or otherwise, it differs from true connective tissue. The question appears to still remain open.

So-called Inflammatory Capsular Cataract.—The anatomical structure of capsular cataract is the same whether it is congenital, whether it arises in early life from purulent ophthalmia or corneal perforation from any other cause, whether it is a

primary change in adult life, or a secondary change in connection with senile cataract or with consecutive cataract. It has been a much disputed question whether the capsular cataract met with in connection with inflammatory conditions of the iris, cornea, etc., represents the product of cells—white blood-corpuscles, pus cells—which have migrated into the lens from without, or whether it is formed from the elements of the lens itself. Becker asserts, as his definite conclusion, that those varieties of capsular cataract which arise secondarily to inflammatory processes in the eye are formed, like the other kinds, by proliferation of the capsular-epithelium. He quotes the observations of Deutschmann (*vide* O. R., vol. i., p. 93), Sinclair, and others to prove that where pus cells effect an entrance into the lens they do so by destruction of the capsule; it is unproved that cells of any kind can migrate into the lens and leave the capsule entire.

It has been asserted that a real capsular cataract has no existence, inasmuch as the changes take place within the capsule and not in its substance proper. The capsule itself does, however, undergo certain changes. As already stated, it is frequently split into layers by the separation of a thin lamella from its inner surface; a similar thin lamella sometimes splits from its outer surface also. It is also often raised, wrinkled, and folded by the contraction of the new substance within it. It is this contraction of the capsule, probably, which tends to loosen the attachment of an over-ripe cataract to the suspensory ligament, and permits of its extraction in the unbroken capsule.

(*To be continued.*)

H. SATTLER (Erlangen). The Nature of Jequirity Ophthalmia. *Klin. Monatsbl. für Augenheilkunde*, June, 1883.

This extremely interesting paper contains the results of an investigation into the nature of the ophthalmia produced by jequirity, undertaken last October to ascertain the correctness of a supposition of de Wecker, that the essential cause of this ophthalmia was some vegetable ferment.

Sattler first describes the action of a single application of a good fresh infusion (about $\frac{1}{2}$ to 1 %) to the normal human conjunctiva. He found the application itself, as is well known, painless; an incubation period of about three hours followed, and after about sixteen hours the signs of well-marked ophthalmia showed themselves, having the now familiar characteristics of jequirity ophthalmia. In about another sixteen hours the process had reached its highest point, at which it rested for about twenty-four hours, after which it began to decline. The infusion used was made by macerating the crushed and decorticated seeds in water at the temperature of the atmosphere of the room for twenty-four hours. Shortening of the period of maceration lessened the intensity of the inflammation, and increased number of applications or use of a more concentrative infusion had the opposite effect; but the effect in the latter case stood in no direct proportion to the amount of concentration. No essential alteration was found when the infusion was made with water at the freezing-point, but a temperature of 33° C. diminished its power, and by simply keeping for a sufficiently long time it lost its efficacy entirely.

In rabbits, after one attack of jequirity ophthalmia, a second application only produced a mild attack of conjunctivitis, but if considerable changes had occurred in the conjunctiva a second application produced no effect at all.

Neither Sattler nor Hilger succeeded in extracting any chemical product from the seeds whose action upon the conjunctiva bore any resemblance to that of the fresh infusion.

Sattler found, however, in the fresh-filtered infusion, vast quantities of a bacillus having the following characteristics:—Cylindrical, homogeneous, opaque rods, of about 0.58μ in thickness, and 2.5 to 4.5μ in length, partly motionless, partly swinging and twisting without changing their places, and partly moving about the field with great liveliness. After a few hours their number increased, and they for the most part engaged in the process of subdivision. At this period they began to collect into masses upon the surface of the infusion, and the formation of spores commenced as a collection of a darker substance at the poles of the little rods, which soon assumed a globular shape. The larger rods contained

commonly one or two such spores, but some contained a very much larger number, and degenerated into mere chains of small spore-cells. During all this time the infusion became more opaque and more yellowish green, and its smell changed from that proper to jequirity infusion, to one more like that of putrefaction. After standing for a week the fluid became clear again, and had again the odour of the fresh infusion, and chemical examination then showed that it had lost all its albumen.

Temperatures above 36° C. interfered with the development of the bacilli, and high temperatures prevented it entirely. After freezing, a short spell of ordinary temperature restored all their vitality.

The spores were extremely hardy, especially when dry. In that condition they would endure 110° C. for five minutes, but when moist $15''$ boiling destroyed them. The bacillus required a considerable quantity of atmospheric air for its growth.

In the purulent discharge from the conjunctiva, and in the false membrane, spore-bearing bacilli were found, but not to the same extent as in the tissue of the conjunctiva itself.

Half-an-hour's boiling made the infusion useless, but when filtered and exposed to the air a weak and not very effective generation of bacilli developed themselves, so Sattler attempted to sterilise the infusion by exposing it during an hour daily for eight days to a temperature of 58° C. His attempt failed, but the efficacy of the infusion was very considerably impaired.

Sattler then prepared an infusion under scrupulous precautions against the entrance of spores, and succeeded in obtaining a fluid free from organisms; still the fluid, when dropped upon the conjunctiva, produced ophthalmia, and this he accounts for by the entrance of specific spores from the air during the instillation. He then injected from the skin subcutaneously under the fornix conjunctivæ of rabbits the following six fluids:—(1) Cold boiled distilled water; (2) a peptonised meat extract; (3) a pure crop of *bacillus subtilis*; (4) a jequirity infusion free from spores; (5) an ordinary jequirity infusion; (6) a pure crop of the specific bacillus. In the first four experiments the injection merely produced a

temporary local swelling; but in the last two it produced an abscess containing cheese-like matter and large quantities of the bacillus in question.

Corrosive sublimate (1 : 10,000) prevented the development of the bacillus, but did not destroy the spores, nor prevent the occurrence of ophthalmia. Thymol (1 : 1,100) rendered the infusion useless and sterile, but Iodoform had no antiseptic action whatsoever.

Sattler succeeded in cultivating the bacillus in various soils, of which gelatinised blood serum and meat peptone with gelatine were about the most suitable, and all the cultivated bacilli produced an ophthalmia, which, though not so intense as that caused by the fresh infusion, resembled it in all essential particulars. No lessening of pathogenic properties could be detected in the course of several generations of bacilli.

The question whether there exists a bacillus of the above-described morphological properties which can produce the characteristic ophthalmia without the intervention of a jequirity infusion, Sattler answers in the negative. A somewhat similar bacillus was found in pea infusion, but its action upon the conjunctiva differed from that of the jequirity bacillus. Sattler concludes, then, that there exists a widespread but harmless bacillus, which has the power of acquiring in a jequirity infusion a new physiological property—namely, that of producing a distinct form of ophthalmia if brought in contact with the living conjunctiva; and this property so acquired is preserved in subsequent generations, even when they are cultivated upon indifferent soils.

The cure of trachoma by jequirity or by purulent inoculation is explained by Sattler as follows:—The soil upon which the micro-organism of trachoma flourishes is incapable of nourishing it when invaded by the micro-organisms of jequirity, and of purulent ophthalmia respectively, and consequently the course of the trachomatous process is cut short. This theory must undoubtedly be accepted, if Sattler's views upon the pathology of trachoma are considered proven (*vide* O. R., vol. i., p. 406); it is to be regretted that, although Sattler's observations have been now nearly two years before the world, no other observer has undertaken experiments to test his results.

O. PURTSCHER (Klagenfurt). Erythropsia in Aphakia.
Centralbl. f. prakt. Augenheilkunde, June, 1883, p. 161.

Erythropsia, or red vision, the disturbance of the visual function, in which objects appear red instead of in their natural hues, has been many times observed after extraction of cataract; it is also occasionally met with apart from cataractous changes, and where no operation has been performed. The significance of the symptom is not well understood. Purtscher gives an interesting analysis of a series of cases observed by himself and others. The following is an epitome of the cases.

I. Hirschler. (*Wiener med. Wochenschrift*, 4, 5, 6, 1883). Dr. Hirschler observed the phenomenon in his own left eye after cataract extraction; it occurred first some months after the operation, during a summer holiday, in the open air, and towards evening; in the house it was not noticed unless the gaze was directed towards the window. It recurred frequently, and always in the evening. It disappeared on partial closure of the eyelids, and this Hirschler ascribed to the occlusion of the coloboma left by the iridectomy; its disappearance in the house he attributed to hemeralopia, which had existed since the operation.

II. Dimmer. (*Wiener med. Wochenschrift*, 15, 1883.) The patient, a woman, underwent discission for cortical cataract in both eyes, at separate times, with good result. Red vision appeared in the eye last operated on, not in the other; at first in the morning only, later, whenever she laughed much or danced. It disappeared in the open air. The pupil remained intact, circular, and active.

III. Hirschberg. (Unpublished.) A man, aged 68, with cataract in both eyes, underwent extraction by Graefe's method on the left; the coloboma was broad; recovery without irritation; $V = \frac{1}{5}$. A week or two after his discharge, on waking from an after-dinner nap, during which he lay for the first time on the operated side, he saw all objects blood-red. He went into the open air and the red vision disappeared; it returned as he re-entered the house. It recurred on waking the following morning, and then regularly morning and evening. On examination some months later, the eye remained entirely free from irritation, and with V as before.

IV. Hirschberg. (Unpublished.) A man, aged 49, underwent a preliminary iridectomy, and a month later extraction of cataract in the right eye; small coloboma upwards; recovery normal; $V = \frac{1.5}{5.0}$. Twelve months later, and again several times afterwards at long intervals, the patient returned complaining of red vision; acuity remained good, and the eye free from all irritation. In the open air there was no red vision; it appeared as he returned indoors at evening; lasted through the evening, and disappeared next morning, and was the more pronounced the longer he had been out; it disappeared when he closed the operated eye, and used the other only, which retained some sight. Red appeared red; white, red; green, red; blue, violet.

V. Purtscher. A woman, aged 70, underwent cataract extraction by Graefe's method on the right eye; healed with $V = \frac{6}{32}$; clear pupil with wide coloboma, and there is incarcerated at each side of the incision. Nearly two years later, on a very bright, hot day, while hanging clothes in the open air, without the coloured glasses which she usually wore, she suddenly saw all things red, especially the sky. This appearance became more intense towards evening, and persisted within doors, especially on looking towards the window. The appearance recurred many times afterwards at different times of day, but especially at evening. At the time of its first occurrence the days were very hot, and the patient was much on foot.

VI., VII., VIII. Purtscher relates another fresh case, and gives details of two more previously recorded by him. In essential points they resemble the foregoing. From these eight well-marked instances he draws the following conclusions:—

1. The erythropsia of aphakia is not an optical phenomenon.—Chromatic aberration will not explain it, for it is not the margins only of objects, but the entire objects which appear red. Two other optical causes are conceivable, namely, a cloudiness of the media, through which red light only, or chiefly, can pass, and hæmorrhage into the vitreous or retina, but neither of these will hold good, for the phenomenon appears and disappears periodically; there is no deterioration of acuity in the affected eyes, and the ophthalmoscope reveals no change.

2. It is not essentially dependent upon the coloboma in the iris, and cannot be connected exclusively with Graefe's method of extraction.—In Dimmer's case the pupil remained intact and circular, and retained its normal activity.

3. An explanation, based on the phenomena of colour-contrast, does not accord with the observed facts.—It is not improbable that a long exposure of the eyes to green surroundings might, under some circumstances, lead to subjective sensations of a complementary kind, but in the cases in question the phenomenon occurred sometimes immediately after waking from sleep, and sometimes when the patient had been for a whole day in his workshop.

4. Hirschler's hypothesis, which attributes the erythropsia to fatigue of the retina, is in accordance with physiological observations.—Thus Aubert found that, when wearing dark-blue or dark-green glasses, his power of perceiving blue and green respectively was lost in ten minutes, while in the case of red glasses the sensitiveness for red was not lost for many hours. It would seem, therefore, that the retina tires sooner of the more refrangible rays of diffuse light than of the less refrangible. Further, it is to be noted that under a diminishing illumination red is perceived after all other pigments have become imperceptible,* and this would become all the more important in a person affected with hemeralopia, as Hirschler says that he himself was, subsequent to the extraction of the cataract. Moreover, according to the observations of C. F. Müller, the same object under the same intensity of illumination appears to the normal eye twice as bright in the morning as in the evening. The occurrence of erythropsia by preference in the evening, and within doors, accords with the idea of its depending upon

* According to most authorities the reverse of this is true. Purkinje found that blue was visible by a weaker light than red. Dove observed that as a general rule the less refrangible red and yellow rays have a preponderance of power in strong illumination, the more refrangible blue and violet rays in a weak illumination. Helmholtz confirms this by pointing out that in looking at pictures in a dull evening light the reds disappear first, the blues remain longest visible (*Helmholtz, Physiolog. Optik.*, p. 317). More recent experiments by Landolt show that in the case of very small coloured objects, viewed under minimum illumination, the centre of the retina is most sensitive for red, the periphery for blue (*Graefe-Saemisch, vol. ii.*, p. 535.)

fatigue of the retina and reduced intensity of light-stimulus. The presence of a coloboma in the iris, and the lowered refraction of the eye would favour the fatigue of the retina by subjecting peripheral portions of the retina to a stronger illumination than the normal.

5. It is a purely subjective phenomenon, referable to the light-perceiving apparatus, and dependent upon nerve influences, partly direct, partly indirect. A retina which has been long screened by an opaque lens is probably over-sensitive to light when the cataract is removed, and hence is especially liable to fatigue. In addition to this direct predisposition, there was in many of these cases probably an indirect influence also, arising from such conditions as congestion, overheatedness, general exhaustion, and mental excitement—conditions which are well-known causes of nerve-depression, and which, in presence of a too easily fatigued retina, might presumably induce that torpor for certain colours which appears to underlie erythropsia. If a coloboma acts as an auxiliary cause by increasing the amount of light falling upon the retina, dilatation of the pupil would do the same; it is noteworthy that the nervous influences just referred to are often productive of mydriasis.

Purtscher suggests that red-vision would probably be heard of more frequently than it is, immediately after cataract operations, were it not for the careful protection of the eyes universally employed during this period; also that slight degrees of it are probably much more frequent than the complaints of it which come to the surgeon's knowledge.

Hughlings Jackson has likened the subjective colour-sensations which precede epileptic attacks to spasmodic action in the motor tracts, loss of colour-perception to paralysis; the idea may have an application in the present class of cases also. It is true that aphakial eyes exhibit a special liability to erythropsia, and that the phenomenon may be entirely limited to the one eye operated on, but this is not opposed to the idea of an essentially nervous cause; the optical conditions in such eyes, by their effect upon the illumination of the retina, act, doubtless, as auxiliary causes.

A. VOSSIUS (Konigsberg). Bilateral Symmetrical Corneal Opacities after an Epileptic Attack, with partial Trigeminus-Anæsthesia). *Klin. Monatsbl. für Augenheilk.*, June, 1883.

The patient was a male aged 35, who had for some ten years been subject to epileptic seizures, one occurring about every nine months. The last attack had taken place six weeks before coming under observation, and after it he felt as if sand had been blown into his eyes, but the eyes showed no signs of inflammation. He noticed "some things lying on the pupils" a little later, which were found to be opacities in the cornea. On examination Vossius found the eyes healthy, except for a slight pericorneal vascularity, and the symmetrical corneal opacities, which lay in the substance of the cornea, were of a bluish-white colour, and were covered by epithelium perfectly normal in appearance. However, in this region the cornea was completely anæsthetic, while the rest of the cornea, the conjunctiva, and the whole district supplied by the trigeminus possessed normal sensibility. The opacities lay in the lower inner quadrants, and that in the left eye was slightly larger than in the right, covering the whole pupillary area, while in the right eye the upper outer portion of the pupil was uncovered.

Vossius, rejecting the old theory, which attributed the disordered nutrition of the cornea to the paralysis of its sensory nerves, and Snellen's supposition that the loss of sensation leads to exposure and consequent injury, follows Meissner in assigning the affection to a lesion of the trophic nerve-fibres, which run in the first branch of the fifth nerve. According to this view disorders of corneal nutrition occur in fifth paralysis only when these trophic fibres are implicated.

Vossius quotes cases against Erb to prove that corneal trophoneurosis occurs as well in central as in peripheral lesions of the fifth nerve, and while not positively assigning any definite locality to the nerve lesion in his own case, is inclined to attribute the circumscribed corneal anæsthesia to a central cause. The patient stated that the opacities were on the decrease, and Vossius considers it not improbable that they would in time disappear, basing his opinion on the published cases of von Graefe, von Hippel, and Dixon.

Tests for Colour-sense and Acuteness of Vision among Sailors. *British Medical Journal*, August 18, 1883, p. 334.

At the recent annual Meeting of the British Medical Association, in the Section for Ophthalmology, the above-named subject was discussed. The speakers were Dr. Brailey, Professor Snellen, Dr. C. E. Fitzgerald, Mr. G. E. Walker, Dr. McMillan, Mr. McHardy, Mr. Edgar Browne, Dr. McKeown, Dr. Grossmann, and the President, Mr. T. Shadford Walker. The following resolutions were passed :—1. That, in the opinion of this Section, it is of international importance that a proper system of testing the sight of seamen be adopted. 2. That the system comprise an examination, by competent persons, of the sharpness of sight of both officers and able seamen ; this being at present entirely neglected. 3. That the imperfect examination for colour-blindness to which the Board of Trade at present submit candidates for officers' certificates be revised, and be extended also to able seamen. 4. That pilots be subjected to the same tests, under some central authority, in place of the present varying and ineffective system of examination. 5. That anyone failing to pass such examination be excluded for the future from the responsible navigation of a vessel. 6. That, in case of all accidents at sea which may be due to defective sight, the vision of all concerned should be made the subject of inquiry by competent persons.

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ON THE MECHANICAL TREATMENT OF DETACHED RETINA.

BY KARL GROSSMANN, M.D.

The causes of detachment of the retina are many, our means of treating it few and uncertain. Whether it be produced by a traumatism, by an effusion from the choroid, by a cicatricial contraction in the vitreous itself after a partial escape of the latter, or by any other cause, the danger to the retinal function lies in the perishableness of the external layer of the retina—the rods and cones. On the one hand we usually cannot remove the cause of the detachment; indeed, we often do not even know it. On the other hand, the rods and cones undergo in the detached parts, at a very early stage, changes which most likely preclude a return to the normal condition even after the retina is replaced. These two circumstances, singly and combined, account partly for the great want of success of any mode of treatment in the majority of cases.

And yet, we all have observed instances of repair in cases in which the detachment occurs first in some part of the upper hemisphere of the eyeball. Very soon the detachment changes its place, the subretinal fluid descends into the lower parts of the eyeball, the scotoma rising accordingly, and the primarily detached parts not only are replaced, but regain and retain their function even in a normal degree. In cases of recent detachment, therefore, we are certainly justified in expecting a satisfactory functional result if we are able to replace the retina early, and the more successfully the earlier we act.

The most constant feature in detachment of the retina is a decreased tension of the eyeball, almost the only exceptions to this rule being cases of intraocular

tumour. Glaucoma, generally speaking, is as antagonistic to detachment of the retina as emphysema to phthisis, though a glaucomatous eye may, at a later period, pass into an atrophic state with secondary detachment, as we all know.

From these two facts, the possibility of restored function in spontaneously replaced parts of detached retina on the one hand, and the decreased intraocular tension on the other, it was therefore not a very great step to try to evacuate the subretinal effusion, and to increase the intraocular pressure.

Both have been tried in different ways. The simplest and gentlest mode which has been proposed for obtaining the latter is the prolonged external pressure, which Samelsohn, of Cologne, has recommended so highly. He aims at increasing thereby the intraocular tension, facilitating the resorption of the subretinal fluid, and preventing new transudations. This method is admirably simple, but in the hand of most of those who have tried it, it has proved itself ineffective.

More effective has been the evacuation of the fluid by operative means. Good results have been recorded both by the external puncture of the sclera and by the internal discission of the retina. However, the scleral puncture cannot be performed well unless the detached parts are in a somewhat anterior or equatorial part of the eyeball; and this method, as well as the puncture of the retina, are very often followed by an effect of only very short duration, subsiding soon into the *status quo ante*.

Encouraged by the results of Leber's experiments on foreign bodies in the vitreous, communicated to the London International Congress, which showed how indolent the vitreous is towards any foreign body of indifferent chemical qualities, I have endeavoured to combine the two methods, that of evacuating the subretinal fluid and of increasing afterwards the intraocular pressure. I have tried a proceeding which, *à priori*,

seemed rather risky, especially when we know that Arlt observed, after dissection of the retina, not only thick opacities in the vitreous, but iridocyclitis and destruction of the eyeball.* My mode of proceeding was to aspirate the effused subretinal fluid with a very thin hypodermic syringe, and to raise the intraocular pressure by injections of an indifferent fluid into the vitreous followed by a tight compressive bandage.

The results were satisfactory enough to induce to further trials. I will give my three cases quite briefly.

CASE 1. The patient, a lad of 18 years, had in the left eye a fairly large detachment below and to the inner side of the optic disc, resulting from a blow six months previously. Eye emmetropic. Scleral puncture was almost impossible, the affected area being out of reach; occlusive bandage had failed. I introduced a canula at the outer side of the eye—the opposite point of the globe to the detachment—about $\frac{3}{8}$ of an inch from the corneal margin, and, under the guidance of the ophthalmoscope, brought it into the detached retina; then the piston was withdrawn, and with it some drops of a serous slightly opaque fluid. Immediately after this was done, the eyeball felt considerably softer than before. I then proceeded to the second part of the operation—the introduction of fluid into the vitreous. I withdrew the needle a little—about a quarter of an inch—filled the syringe with a lukewarm solution of .75 per cent. common salt, and, after changing the direction of the needle a little, so that the fluid might not pass into the old channel, I injected about five drops into the central part of the vitreous. The eye soon showed the signs of high pressure; the pupil, well dilated before the operation by atropia, became a little narrower, but not much, and the patient, who did not complain of any pain before, complained of a cloudiness of vision and a dull feeling in the eye and surrounding parts. I had injected the fluid *very* slowly, and stopped as soon as the patient complained; then I withdrew the needle carefully and applied a tight occlusive bandage with firm pressure.

* It is more than probable, however, that in those very unfortunate cases infection of some kind, imported with the instrument into the eye, was the cause of the destructive inflammation.

I was rather anxious as to what reaction would take place. My anticipation of *some* reactive inflammation, however slight, proved happily thoroughly unfounded. As the patient did not complain of anything, I left the bandage on for two days; then I lifted it, and seeing nothing wrong, replaced it at once. After a week the retinal detachment seemed smaller in extent, and certainly much shallower; the scotoma seemed slightly diminished. After another week's bandaging there seemed to be no change, and as no reaction whatever had taken place, and not even an opacity in the vitreous could be detected as the result of the needlewound, I repeated the injection, this time without aspirating the subretinal fluid, injecting the fluid into the lower part of the equatorial region of the eyeball. Occlusive bandage followed. The same symptoms during the injection; no reaction. After another week the detached part was again smaller than before, but distinctly noticeable still. The scotoma was much reduced; the sight, however, in the reattached parts of the retina was very poor, movements of the hand only being seen at about 4 or 5 feet distance.

The patient left at the end of a month, during which time no change was observed.

CASE 2. This case was a very similar one. A young man, 25 years of age, had suffered a severe blow on the head by falling down stairs about three months ago. He came with a shallow but extensive detachment of the retina in the right eye in the lowest part of the eyeball, the left eye being in a normal condition. The detachment being so shallow I was not disposed to withdraw any of the subretinal fluid, but decided to try the injection into the vitreous body only. The point of the canula was introduced, and the .75 per cent. solution of salt injected. The patient complained in the same manner as the first one of a slight dull pain and a cloud rising in front of him. The tension of the eye was at the time considerably increased. After the careful withdrawal of the canula a compressive bandage was applied, and no complaint being made, was not removed until after the second day. No traces of any reaction were shown. The detached area was undoubtedly smaller in size than before, and the scotoma was also reduced, though the replaced parts were only in a very small degree capable of perceiving light. At the end of the first week I

again injected some drops into the vitreous, and this time I did not remove the bandage for a week, but only tightened it when it became slack. The effect at the end of the week was most surprising, for the detachment was entirely gone. The retina was replaced in all its extent, only a yellowish-white plaque remaining in the middle of the former detached area. The functional effect, however, was only a very poor one, the perception being reduced to movements of the hand, which were noticed within about one yard from the eye.

CASE 3. The third case is somewhat different. A woman of about 30 years of age had a large but not very deep detachment extending over the greater part of the lower half of the right eyeball. She said this eye had been affected almost as long as she could remember. Refraction, myopia 3 D, and small posterior staphyloma, in each eye; central vision nearly 1 with—3, 0.

I injected a few drops into the right eye. No reaction followed, but on examining with the ophthalmoscope after the lapse of a week I found a rather thick opacity in the vitreous; this cleared up, however, almost entirely in three weeks without inflammatory symptoms. The detachment was reduced in size. After a second injection the same opacity of the vitreous followed, this time not clearing up as much as before, though sufficiently to allow me to recognise a great reduction of the detachment. There was no improvement of vision. I desisted from further surgical interference, as no advantage could be expected in a case of such long standing.

In summing up these three cases, the only ones which have come under my notice lately, I must confess that I did not anticipate such an entire absence of reaction on the part of the vitreous as they presented, though Leber's experiments have shown that glass, gold, and other chemically indifferent substances may be borne without causing the slightest inflammation by the eye of the rabbit.

The results obtained were, as far as the replacement of the retina goes, highly satisfactory. That functional improvement was so small in two cases, and absent in the third, was certainly due only to the changes which

had already taken place in the structure of the detached retina; it does not detract from the value of the method, which seems, from the cases thus far tried, not to entail any serious risk.

In looking through the literature of the subject I find a passage in Arlt's chapter of operations (Graefe-Saemisch, iii., 2, p. 372), in which he describes an instrument similar to a hypodermic syringe shown to him by Weber, designed for the purpose of aspirating fluid from the subretinal effusions, and having a second thin canula through which fluid might be introduced. The idea is, therefore, not an altogether new one, though I only discovered Weber's priority after I had operated on my own cases. Whether Weber has actually operated at all in this manner I cannot find out from the literature at my disposal.

THE ESTIMATION OF REFRACTION BY RETINOSCOPY BEFORE AND AFTER ATROPINISATION.

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It has been for many years an accepted principle among oculists that the accommodative apparatus of the observed eye remains in a state of rest during direct ophthalmoscopic examination, more especially, indeed, if the ophthalmoscope used be one not producing an excessively brilliant illumination, if the dark room be of large dimensions, and if the patient's other eye be covered, or have no definite object to observe which might excite accommodative efforts. It does not appear that any series of cases was published to establish the validity of this principle, and to ascertain in what percentage of cases it does not hold good. The chief original authority for the truth of the proposition is Mauthner, whose statement on the subject is to be found in his *Lehrbuch der Ophthalmologie* (Wien, 1867), page

174, which reads as follows :—" If in a number of cases the amount of H. is estimated first by direct ophthalmoscopic examination without using atropine to paralyse the accommodation, and subsequently after atropinisation the amount of H. in the two examinations will be found to be equal in every case." He does not give any series of cases in which the principle was tested, but there can be no manner of doubt that in the main he is right. Were it not so, indeed, the diagnosis of latent hypermetropia would have been a matter of exceeding difficulty to oculists for many years past.

Schmidt-Rimpler, in a paper read before the Naturforscher Versammlung, at Cassel (Nagels Jahrbuch, 1878), states that the error made is not more than 0.5 D in 71 per cent. of the cases examined by a competent observer.

For some time past the method of retinoscopy has been superseding that of direct ophthalmoscopic examination as a means of estimating the amount of ametropia, and, even granting that in the latter method the patient's accommodation remains at rest, there is no reason on the face of it to assume that the observed eye behaves in the same manner with respect to its accommodation during retinoscopic as during direct ophthalmoscopic examination. I thought, therefore, it might be interesting to ascertain what actually took place in a series of cases when the refraction was tested by retinoscopy before putting the patient under the influence of atropine. The number of cases is unfortunately small, as from want of time and other causes I omitted to test many patients by retinoscopy before prescribing atropine, and most of those whom I did test were not subsequently put under the influence of atropine, as all that was essential to their treatment had been already ascertained. The cases, however, include all in my private notebook which contain any information upon the question at issue. It will be seen that

even some of these must be excluded as worthless, either from imperfect atropinisation, or probable error in either the first or second observation.

There were in all nineteen eyes examined, belonging to ten individuals. Of these eyes eleven were non-astigmatic, and all these were myopic, four exhibited compound hypermetropic astigmatism, two simple hypermetropic astigmatism, and two mixed astigmatism. It is to be regretted that the series contains no cases of simple hypermetropia uncomplicated by astigmatism.

The examination was undertaken in an ordinary darkened sitting-room, the patient being about four metres from the opposite wall, and the pharmacopœial liquor atropiæ sulphatis was the mydriatic used, one drop of it being instilled twice a day for two days. In a few cases two drops were used three times a day, the effect of the first prescription being found insufficient. In nearly all the cases the plane mirror was the instrument used, as recommended by me in the *Ophthalmic Review*, August, 1883.

Of non-astigmatic eyes there were eleven examined.

1. Male, aged 18. Right eye, before use of atropine $M=3.5$ D. After atropine $=3.5$ D. (Registry, 219 C.)

2. Left eye of same patient presented the same figures.

3. Female, aged 25. Right eye, $M=3$ D before, and $M=2.5$ D after atropine. (Registry, 196 C.)

4. Left eye of same patient same figures exactly. In these two eyes the second examination was only a subjective test by glasses.

5. Male, aged 16 (?) Right eye, $M=3$ D before, and 4 D after atropinisation. (Registry, 184 C.)

6. Left eye of same patient, $M=3$ D both before and after use of atropine.

7. Male, aged 20 (?) Right eye, $M=2.75$ D before, and 4.5 D after atropinisation. (Registry, 27 C.)

8. Left eye of same patient gave exactly similar figures.

In these two eyes it is probable that atropine had not produced complete paralysis of accommodation. The second examination was only subjective testing, and the patient was not able to return for further investigation, so that spasm of accommodation cannot be excluded as a cause of the discrepancy in this case.

9. Female, aged 25 (?) Right eye, $M=5.5$ D before and 5 D after atropinisation. (Registry, 10 C.)

10. Left eye of same patient gave exactly similar results.

11. Right eye of man aged 19 (Registry 245, C) both before and after atropinisation, $M=5$ D.

It will be observed that all these eleven eyes were myopic. In four of them atropine left the refraction unaltered; in four it reduced the myopia by 0.5 D; and in three it produced an apparent increase of myopia, varying from 1 D to 1.75 D. Two of these last three cases are accounted for by imperfect atropinisation (Nos. 7 and 8). In them the test employed after use of atropine was not an objective one. It is contrary to well-established physiological fact to assume that atropine could develop a myopia previously latent, and it is highly improbable that so great an error of observation as 1.75 D could have been made when using a method of examination so easy and so exact as that of retinoscopy, especially retinoscopy with the plane mirror. In the third case (No. 5) I fear an error of observation must have crept in. This case and one other are the only cases in the whole series where myopia, tested objectively, was found apparently increased after the use of atropine, and I conclude I must have either jotted down a wrong figure, or have been too hastily satisfied with the neutralising glass in either the first or second retinoscopic examination. It must be remembered that these notes were not made for the purpose of publication, but only to satisfy my own mind upon the practical utility of retinoscopy as a means of diagnosing refraction. I had been content

with the direct ophthalmoscopic examination for that purpose, and before finally abandoning it for retinoscopy I wished to ascertain if the new method were not inferior to the old.*

Four eyes were examined, exhibiting compound hypermetropic astigmatism.

1. Right eye of girl, aged 10. Before atropinisation the two principal meridians exhibited $H=7$ D, and $H=8$ D respectively. Afterwards, $H=8$ D and $H=10$ D.

2. Left eye of same patient. $H=7$ D and $H=8$ D before, and $H=8$ D and $H=9$ D after atropinisation. (Registry, 355 C.)

3. Right eye of boy, aged 15. Before use of atropine $H=0.5$ and $M=0.5$ D. Afterwards, $H=2$ D and $H=1$ D.

4. Left eye of same patient exhibited precisely similar figures in the two principal meridians. (Registry, 186 C.)

Two eyes suffered from simple hypermetropic astigmatism.

1. Right eye of a woman, aged 28 (?) Before atropinisation, $H=4.5$ D and $M=0.5$ D. After atropine, $H=4.5$ D, and the apparently myopic meridian was found to be emmetropic. (Registry, 9 C.)

2. Left eye of same patient. Before atropine, $H=1.5$ D, and $M=0.5$ D; after atropine $H=1.5$ D, and in the apparently myopic meridian emmetropia.

In these last six eyes the refraction in a meridian remained only twice unaltered; it diminished twice by 0.5 D, three times by 1 D, four times by 1.5 D, and once by 2 D.

Two eyes with mixed astigmatism were examined.

* Since writing the above I have examined five myopic eyes in which the subjective test exhibited a lower degree of myopia than was demonstrated by retinoscopic examination. None of these were put under the influence of atropine. The glass selected in the subjective test was the weakest with which the maximum power of V was attained, and none of them had any demonstrable astigmatism. In three the difference amounted to 0.5 D and in two to 2 D. Taken together with the other cases in which the same phenomenon occurred they tend to lessen the value of retinoscopy as a test for latent hypermetropia. I should add that both the patient's eyes were open during all my retinoscopic examinations.—J. B. S.

1. Right eye of a man, aged 24 (Registry, 193 C). $H=2\cdot25$ D, and $M=3$ D before, and $H=2\cdot$ D, and $M=1\cdot75$ after atropinisation.

2. Left eye of same patient. Before atropine, $H=3$ D, and $M=2\cdot75$ D. After atropine, $H=3\cdot5$ D, and $M=1\cdot25$ D.

In these two eyes the refraction in the principal meridians diminished three times, and apparently increased once, the hypermetropia in one meridian being found lessened by $0\cdot25$ D. This increase in the refraction is so small that it must be attributed to an error of observation. Probably I did not remove myself sufficiently far from the observed eye in the second examination. It is certain I did not observe this discrepancy at the time of the examination, or I would have investigated it, and ascertained if it was founded on fact.

There were nineteen eyes examined altogether, but from the examination of four of these no sound conclusion can be drawn, in two atropinisation being imperfect, and in two there being an error of either observation or notation, so that only fifteen are left suitable for the purposes of the present inquiry. If we consider each of these fifteen as possessing two principal meridians, the alterations that took place in the refraction as tested by retinoscopy before using atropine and afterwards were as follows:—The refraction of a meridian remained unaltered ten times, it diminished by $0\cdot59$ D eleven times, by 1 D three times, by $1\cdot5$ D five times, and by 2 D once. The average change was $0\cdot6$ D, and in more than two-thirds of the instances, or 21 out of 30, the refraction either remained unaltered, or did not diminish by more than $0\cdot5$ D. It is not without interest to note that this corresponds very closely to what Schmidt-Rimpler ascertained to be the proportion of error in direct ophthalmoscopic examination, and in his own method of measurement by means of the inverted image. The error was not greater than $0\cdot5$ D in 71 per cent. of the

cases examined by the former method, and in 73 per cent. of those examined by Schmidt-Rimpler's own method.

I am aware that the few cases I have examined are not enough to justify any very positive conclusions, but so far as they go they are not without value, and I publish them not so much to lay down an absolute rule but to induce other observers with better means of settling the question at their disposal to investigate the matter, and give us the benefit of their conclusions.

LOUIS DANIEL (Berlin). The Influence of Age upon the Relation between Manifest and Total Hypermetropia. *Centralblatt. f. prakt. Augenh.*, July—August, 1883, p.

This paper is based upon an analysis of all the cases which presented themselves in Professor Hirschberg's clinique at Berlin during the two years 1881-2. It is the more important because, with the exception of a paper by Schröder, nothing definite has been published upon the subject since Donders' classical work on the Anomalies of Refraction and Accommodation in 1866. Donders' conclusions are, as is well known, that while at the age of 20 or so about one half of the total hypermetropia is manifest, at the age of 40 two-thirds is manifest, and at the age of 70 the total hypermetropia and the manifest are equal. These conclusions have now to be modified by the light thrown upon the subject by Hirschberg's cases.

By total hypermetropia, Hto., is to be understood in this paper the amount discoverable by means of direct ophthalmoscopic examination; in nearly every case it was measured by Hirschberg himself. The paper contains every case where the relation between Hto. and Hm. was noted, except those of very weak Hm. occurring in children under 10 years of age. In all, 347 cases were obtainable, and the results of their examination are exhibited in 12 tables, the first table containing the cases occurring between the ages of 6 and 10, and the remaining tables those of each succeeding 5 years up to the age of 70. The complicated and the uncomplicated cases are given separately.

Four complications are noticed by the author:—(1) Anisometropia, (2) post-diphtheritic paralysis of accommodation, (3) constitutional disease, such as chlorosis, and (4) the long-continued use of convex glasses, which naturally must influence the development of Hm.

Table I. contains 20 uncomplicated and 22 complicated cases occurring between the ages of 6 and 10. An examination of the former shows that in 85 per cent. of the cases about $\frac{1}{3}$ of Hto. was manifest, in 10 per cent. $\frac{1}{2}$ Hto. was manifest, and in one somewhat dubious case alone $\frac{2}{3}$ Hto. was manifest.

Table II. contains 27 uncomplicated and 25 complicated cases occurring between the ages of 11 and 15. An analysis of the former exhibits 21 cases where Hm. was about $\frac{1}{3}$ of Hto., this proportion being, therefore, found in 77·7 per cent. of the cases. In 18·5 per cent. Hm. equalled $\frac{1}{2}$ Hto., and in one case only was Hm. = $\frac{2}{3}$ Hto. Hm. and Hto. were equal in the cases of post-diphtheritic accommodation-paralysis at all ages.

The resumé of the 47 uncomplicated cases in Tables I. and II. shows, then, that between the ages of 6 and 15, or in the first educational decade of existence, 80·85 per cent. of Hypermetropes have Hm. = $\frac{1}{3}$ Hto., or nearly so; 14·89 per cent. have Hm. = $\frac{1}{2}$ Hto.; and 4·25 per cent. have Hm. = $\frac{2}{3}$ Hto.

Table III. contains 25 simple and 24 complicated cases between the ages of 16 and 20. In 19 (or 76 per cent.) of the simple cases, the proportion of Hm. to Hto. was $\frac{1}{3}$, or nearly so, and in 6 cases (24 per cent.) Hm. was equal to Hto.; but 5 of these 6 were cases of very low degrees of H., when, perhaps, glasses had been previously worn, the wearing of glasses not having been always noted in the case books. In 76 per cent. of the complicated cases the Hm. and Hto. were equal.

Table IV. contains 28 simple and 10 complicated cases between the ages of 21 and 25. Of the former, 19, or 67·85 per cent., had Hm. equal to $\frac{1}{3}$ Hto., the proportion being slightly larger in a few cases. In 9 cases, or 32·14 per cent., Hm. and Hto. were equal. In the complicated cases, Hm. and Hto. were equal with but one exception.

Out of the 53 simple cases in Tables III. and IV., Hm. was $\frac{1}{3}$ Hto., or nearly so, in 38 or in 71·7 per cent.; and Hm. was equal to Hto. in 15, or 28·3 per cent. These cases

represent the proportion occurring between the ages of 16 and 25, or in the second decade of educated life.

Table V. contains 21 simple and 7 complicated cases between the ages of 26 and 30. In 13, or 61.9 per cent. of the former, Hm. varied between $\frac{2}{3}$ and $\frac{3}{4}$ Hto. In 5, or 23.8 per cent., Hm. = Hto. ; but these were cases of low degrees of H. In only 3, or 14.3 per cent., Hm. = $\frac{1}{2}$ Hto.

Table VI. contains 19 simple and 8 complicated cases between the ages of 31 and 35. In 12, or 63.2 per cent. of the former, Hm. varied between $\frac{2}{3}$ and $\frac{3}{4}$ Hto. In 2, or 10.5 per cent., Hm. was $\frac{1}{2}$ Hto. or less; and in 5, or 26.3 per cent., Hm. or Hto. were equal. In all the complicated cases Hm. and Hto were equal.

The 40 simple cases in Tables V. and VI., or in the third literary decade (between the ages of 26 and 35), exhibit 5 cases, or 12.5 per cent., where Hm. = or $< \frac{1}{2}$ Hto. ; 25 cases, or 62.5 per cent., where Hm. = between $\frac{2}{3}$ and $\frac{3}{4}$ Hto. ; and 10 cases, or 25 per cent., where Hm. = Hto.

Table VII. contains 28 cases between the ages of 36 and 40, the simple and complicated being in this and the succeeding Tables considered together. In 20, or 71.43 per cent., Hm. = Hto. In 8, or 28.57 per cent., Hm. = between $\frac{2}{3}$ and $\frac{3}{4}$ Hto.

Table VIII. contains 30 cases between the ages of 41 and 45. In 26 of these, or 86.66 per cent., Hm. = Hto. In only four, or 13.33 per cent., was Hm. = between $\frac{2}{3}$ and $\frac{3}{4}$ Hto.

Table IX. contains 22 cases occurring between the ages of 46 and 50, in all of which, with only one exception, Hm. = Hto.

In Tables X., XI., and XII., containing the cases occurring between the ages of 51 and 70, Hm. and Hto. are always equal.

The conclusions drawn from these investigations are, that the proportion between Hm. and Hto (in uncomplicated Hypermetropia) varies as follows :—

Between the ages of	6 and 15,	Hm. = $\frac{1}{3}$ Hto.	(80 per cent.)
„	„	16 and 25, Hm. = $\frac{1}{2}$ Hto.	(72 per cent.)
„	„	26 and 35, Hm. = $\frac{2}{3}$ - $\frac{3}{4}$ Hto.	(75 per cent.)
„	„	36 and 45, Hm. = Hto.	(80 per cent.)

After the age of 46, Hm. = Hto.

In the complicated cases no constant relation is formed between Hm. and Hto., except in post-diphtheritic paralysis,

when Hm. always = Hto., but Hm. is always relatively greater than in the uncomplicated cases of the same age, and after the age of 20 is almost always = Hto.

The great importance of these observations when prescribing glasses for Hypermetropia will be apparent to every oculist.

W. F. MITTENDORF (New York). The Treatment of Detached Retina. *American Ophth. Society; reported in New York Medical Journal July 28th, 1883, p. 103.*

The author of the paper stated that during the last three years he had treated several very extensive detachments of the retina. No new remedy or new method had been used, but a combination of the different plans devised for the treatment of this affection had led to success.

The object of treatment must be: 1. To keep the eye as free as possible from all irritating influences, which is best done by closing both eyes, or by putting the patient into a dark room. 2. To keep the eye as quiet as possible, avoiding all accommodative efforts, and for this purpose it must be kept under the influence of a mydriatic. 3. To place the absorbents in the most favourable condition by means of a pressure bandage: he had found elastic pressure with a rubber bandage of the greatest assistance. 4. To hasten the absorption of the effused fluid by the use of jaborandi or pilocarpine. He had given a hypodermic injection of one-fourth to one-sixth of a grain of pilocarpine early in the morning, and then kept up the diaphoresis by the use of an infusion of jaborandi leaves, from forty grains to one drachm in twelve ounces of water, administered in wineglassful doses during the afternoon and evening. This treatment should be kept up for three or four weeks. He had not seen a single case in which the remedy administered in this way had to be discontinued on account of unpleasant symptoms. If the detachment complicated a specific choroiditis, or if it followed a serous iritis demanding specific treatment, the latter should be used at the same time as the other remedies mentioned. In these cases the disease yielded, as a rule, sooner than in others, and it was not necessary to push the pilocarpine to so great an extent.

Mittendorf reported in detail three successful cases. They tended to show : 1. That in marked detachment of the retina the energetic use of jaborandi and pilocarpine does good, especially if the patient can be kept under the influence of the drug during the entire day, and for a period ranging from twenty to thirty days. 2. That the elastic bandage must be used at the same time. 3. That the patients must be kept upon the back for most of the time. 4. That atropine is useful, and causes no inconvenience.

DIANOUX (Nantes). "Malaxation" of the Eye after Sclerotomy. *Archives d'Ophthalmologie*, Sept.-Oct. 1883, p. 405.

Under this title Dianoux describes a procedure by which he claims to have increased the success of sclerotomy operations.

Sclerotomy aims at establishing a filtration-scar in the region of the ligamentum pectinatum. The incisions which the knife makes by puncture and counter-puncture should measure at least $2\frac{1}{2}$ mm. in height, and should be united by a groove dividing three-fourths of the thickness of the sclera; a smaller cut than this is apt to heal as completely as the puncture made by a paracentesis needle, and hence to fail in its purpose. In a successful operation the internal lips of the wound are held apart more or less during the healing process by the escaping fluid, the pressure of which rises if the outlet tends to become insufficient. Dianoux proposes to assist nature in preventing a too firm closure of the wound by systematic manipulation of the eye.

Placing the tips of the two forefingers upon the upper eyelid, he makes an alternating pressure upon the globe in the region of the incision, just as in an ordinary examination of tension. The pressure is to be sufficiently firm to cause a slight extrusion of fluid beneath the conjunctiva at the points of puncture and counter-puncture. It is begun on the evening of the day of operation, and repeated regularly night and morning for five or six days afterwards; under these circumstances very slight pressure on each occasion suffices to separate the lips of the healing incision and to perceptibly lower the tension. Finally the patients are taught to execute

the manœuvre for themselves, and instructed to continue doing so after they leave the hospital.

Usually one only of the two scars remains visibly a filtration scar, and this was found to be always the one corresponding to the right forefinger of the surgeon, a sign, it is supposed, that the pressure made by this finger is more vigorous than that of the left.

Dianoux got the idea of the so-called malaxation from Pagenstecher's proceeding of massage; the latter is, however, so he tells us, quite insufficient for the purpose in question. The new method does not, he confesses, render every sclerotomy a success.

R. FÖRSTER (Breslau). On the Maturity of Cataract; its Artificial Ripening, etc. *Archives of Ophthalmology*, vol. xi., 1882, p. 344.

H. D. NOYES (New York). On Förster's Operation for Ripening Immature Cataract. *New York Medical Record*, August 4, 1883, p. 118.

S. THEOBALD (Baltimore), and others. Trituration of the Cortex of Cataract. *American Ophth. Society*, reported in *New York Med. Journal*, July 28, 1883, p. 102.

Förster's proposal to hasten the ripening of cataract by manipulating the lens through the cornea at the time of a preliminary iridectomy has now been put in practice with success by several other operators. The matter seems well deserving of attention, both because any method which will safely shorten the trying period, during which a cataract is sufficiently advanced to destroy useful sight, but insufficiently so to permit of safe extraction, will be a great boon, and because this particular method appears founded in a true knowledge of the structural changes on which the ripening of a cataract depends. (*Vide* Becker, O. R., September, 1883, p. 269).

By maturity or ripeness of a cataract for extraction is to be understood a condition in which the whole substance of the lens *can* be evacuated by operation.

Förster lays down very clearly the signs by which this condition should be estimated. The usual criteria of ripeness are that the iris should cast no shadow into the lens on oblique illumination, and that when the pupil is fully under atropine the fundus should not be illuminable with the ophthalmoscope; but they are sometimes fallacious, for there are cataracts which have been ripe for years which still receive a shadow from the iris, and still permit of some illumination of the fundus, and there are unripe cataracts which do neither.

Anatomical examinations seem to show that after *every* cataract extraction—excluding, of course, cases of extraction in the capsule—portions of the cortex are left behind in the capsular fold; in the case of ripe cataracts such fragments are already opaque, they float loosely, and are not subject to a further process of opacification and swelling; but in the case of unripe cataract fragments of transparent cortex are apt to remain adherent to the capsule, and are unremovable from the pupil by any rubbing of the cornea by the eyelid or spoon; then, though the pupil appear black or nearly so at the close of the operation, it is blocked a day or so later by swollen gray masses.

Cataracts of which it may be predicted that they will leave, when extracted, a permanently clear pupil may be classed as follows:—

1. The great majority of cataracts which appear ripe, according to the two ordinary tests already named, and in which there are no sectors shining like mother-of-pearl. Such cataracts are white, yellow, or yellowish gray; the whiter they are, the thicker the cortical substance.

2. Cataracts in which the lens consists wholly of a large brownish-yellow nucleus, no cortex being discoverable, or at most only a very thin layer. Such cataracts may show a considerable degree of semi-transparency, the pupil being more or less illuminable, and the iris throwing a distinct shadow. They also allow a considerable amount of vision. The only alteration which they undergo is that their brown colour becomes darker and darker with time.

3. Certain cataracts of very slow development, with bright yellow or whitish and relatively small nuclei, and a thick layer of semi-transparent cortex (Becker's nuclear cataract). In the

course of years a thin sub-capsular layer grows opaque, but much of the cortex may still remain clear, and the iris still cast a shadow; the anterior surface does not exhibit sectors, and does not glitter like mother-of-pearl. In this stage these cataracts escape from the capsule without leaving any cortical fragments.

A cataract is *immature*, despite the absence of shadow from the iris and the unilluminable pupil, if the cortex presents well-marked glittering sectors. The glitter of the different sectors varies with the angle of the illumination, so that the surface appears faceted. Here there are thin transparent flakes, as well as opaque flakes close beneath the capsule, and, if extraction be undertaken, the former will almost certainly remain within the eye in spite of every effort to remove them. A few months later the sectors lose their sharp contour, break down, and finally disappear; we can then depend upon the exit of the whole cataract.

Artificial ripening. A preliminary iridectomy occasionally expedites the opacification of the cortex in an unmistakable manner. Probably the pushing forward of the lens which follows the escape of the aqueous humour disturbs to some slight extent the connection between the opaque and transparent fibres in the cortex, and thus furthers the degenerative process. Förster promotes this disturbance by gently rubbing or stroking the cornea, immediately after the iridectomy, with the blunt angle of a strabismus hook, or the closed iris forceps. In many cases a rapid and marked effect is gained. Cataracts which were illuminable before the operation may become so opaque in six days as entirely to cut off the reflex from the fundus. Mother-of-pearl sectors in the cortex break up and disappear; the yellowish nucleus previously visible through the semi-transparent cortex becomes entirely hidden. Extraction can generally be undertaken in from four to eight weeks after the operation without fear of any fibres adhering to the capsule.

The only difficulty in the manipulation lies in judging how much pressure to employ; if it be excessive the zonula may be ruptured, and then at the subsequent extraction loss of vitreous is inevitable. Förster does not allude to the production of iritis, which appears to constitute the chief danger according to the experience of others who have practised his method.

Not every cataract can be ripened by this proceeding; the so-called choroidal cataracts in which opacity is limited to the cortex near the posterior pole are little influenced by it. Förster's experience, based on 200 cases, teaches that advantage is chiefly to be looked for in cataracts having a firm and somewhat opaque nucleus; also that it is essential that there should already be some degree of opacity in the anterior cortex even though it be but slight and quite peripheral.

Noyes relates his experience of Förster's method in eight cases—seven persons. All the subjects were over fifty years of age; four were males, three were females. In two individuals only did any reaction on the part of the iris follow the operation. In one of these both eyes were operated on at different times, and both ultimately gave a good result, but severe iritis occurred after each preliminary operation, and again after each extraction; it is to be noted that in this case the cataracts were devoid of all cortical opacity. In the other case, iritis, with a few synechiæ, occurred, but without any prejudicial result. In all cases an increase of opacity was observed to ensue immediately, but the rate of increase differed in the different cases; where cortical opacity was already abundant the effect was prompt and unaccompanied by unpleasant reaction. In no case did glaucomatous symptoms arise.

In the recent discussion of this matter by the American Ophthalmological Society, Dr. Theobald reported two cases, in which he had adopted Förster's method. In the first the "trituration" was done with the angle of the strabismus-hook, and was imperfectly performed; in the second he used the smooth end of the Bowman tortoise-shell cataract-spoon, which seemed better adapted to the purpose. In the first the operation was followed by but slight change in the condition of the lens. In the second a very rapid development of the cataract ensued. In each case there occurred a sufficient amount of iritis to cause slight but persistent adhesions between the iris and lens at the pupillary angle of the coloboma, and in the second case, oblique examination a day or two after the

operation showed that near the cut edges of the iris the pigment layer had been detached from the muscular coat in a manner quite peculiar. That the iris would be more or less bruised as well as the lens, however carefully the trituration was performed, appeared unavoidable, and the risk of exciting inflammation in this manner seemed the chief objection to the procedure. It would appear, however, that Professor Förster had not had serious trouble from this source.

Dr. Gruening had performed the operation twice during the last year. In the first he performed a large iridectomy upward, and with the angle of the strabismus-hook treated the lens in the area of the pupil only. No iritis followed, and the lens became completely opaque within one week. He extracted it three weeks later with very good results. In the second case he performed iridectomy upward, and again treated the lens only in the area of the pupil, including the coloboma, and in four days the lens was completely opaque. He thought there were certain cases in which the operation was indicated, and was attended with great gain.

Dr. Kipp had performed the operation some time ago; the lens became opaque, and four or five days afterward it cleared up again.

Dr. Mittendorf's experience had been equally favourable with Dr. Gruening's.

Dr. Knapp had performed the operation once, but it did not seem to hasten the ripening of the cataract.

Dr. Wadsworth had operated once, eight years ago. There seemed to be no effect at all so far as ripening of the cataract was concerned.

The experience of the President, Dr. H. D. Noyes, was favourable; it has already been referred to.

OTTO BECKER (Heidelberg). The Anatomy of the Healthy and Morbid Lens.

(Continued from page 274.)

Chapter IV. Nutrition of the Lens.—Until nearly the end of embryonic life, the temporary vascular capsule lies immediately upon the structureless capsule, and supplies the nutrient material by which the original cells and fibres increase. After the disappearance of the vascular capsule the lens is

connected with the firmer parts of the eye only by the suspensory ligament, which, like itself, is destitute of nerves and blood-vessels; its nutrition must depend henceforth upon the fluid media which surround it. Deutschmann, Ulrich, Schoeler, and Uthhoff, who have investigated the source and direction of the nutrient streams in the eye by means of injections into the general circulation, all agree in stating that the nutrient fluid enters the lens chiefly, if not solely, in the peripheral region, that is in the zone corresponding to Petit's canal. Samelsohn's observations upon the migration of rust-particles from fragments of iron imbedded in the living lens support the same conclusion. This is the region in which the building up of the lens by the formation of new fibres goes on most actively. Entering from Petit's canal, the fluid percolates the whole lens in a centripetal direction, taking a course ultimately towards the anterior pole, and thence returning centrifugally to the line of insertion of the suspensory ligament to escape into the posterior aqueous chamber.

The experiments of Bence-Jones proved that this percolation of the lens by fluid still goes on even in the fully developed state of cataract.

Many of the clinical and pathological facts referred to in a later chapter agree entirely with this statement as to the manner in which the lens receives its nutrient supply.

The *physical changes* which the lens undergoes with advancing age and under pathological conditions consist in changes of volume, weight, consistency, colour, transparency, and refractive power.

The continuous increase of volume and weight have been already referred to; also the fact that the increase is retarded or ceases as cataract forms. Through a loss of its watery constituents, beginning first in the innermost and oldest layers, the lens hardens and dries up progressively from within outwards, the nucleus and the cortex being distinguished from each other chiefly by their consistency. Simultaneously with the hardening, the layers cease to be perfectly colourless and take on a yellowish tint, but in very various degree; the colouration is sometimes quite faint, even in old people; it reaches its maximum intensity in the condition of the so-called black cataract, which, though causing great impairment of

vision and calling for operation, is not really a cataractous condition at all. The loss of transparency which accompanies the formation of cataract needs no further description.

The progressive loss of refractive power in the senile lens has hitherto been explained by the assumption that in the young lens the index of refraction constantly increases from the periphery to the centre, while the old lens consists of a substance more homogeneous throughout, and possessing the index of refraction proper to the nucleus of the former. Helmholtz has shown that such a change, though it would involve an increase of refractive power in the cortex, would cause a loss of the total refractive power. The recently discovered progressive enlargement of the lens appears to offer another reason for a loss of refraction. The indices of refraction of different parts of the lens substance have been measured by Zehender and Matthiesen, in a series of cataractous lenses; the chief points of interest in their results are these: great differences were found between individual lenses; in some the index of refraction was higher in the cortex than at the centre; in some only it was abnormally high in the nucleus; in many it showed a progressive increase from the periphery to the centre, such as is found in the transparent lens. The last-mentioned observation tells somewhat against the current explanation of the decreased refraction of old age.

Chemistry of the Lens and the Fluid Media.—With the exception of the increase of volume and weight, all the changes in the lens which have been described are referable to alterations in its chemical constitution, and these again to alterations in the constitution of its nutrient fluid. Quantitative analyses of human lenses appear to be quite wanting. The ox's lens consists, according to the latest analyses, of water 63·5 per cent., albuminous substances 34·9 per cent., and lecithin, cholesterin, fat, soluble and insoluble salts, less than 1 per cent. each. It has been assumed, and Deutschmann has proved, that with the advance of age the proportion of water diminishes while the solid constituents increase. Deutschmann also found that in senile cataract the proportion of water is greater, of solid constituents less, than in the transparent lens; but this Becker only admits as true for cataracts which are maturing, or are already mature, not for incipient and hypermature shrunken cataracts.

Very little is yet known concerning changes in the intraocular fluids in connection with the development of cataract. The constitution even of the normal fluids is not yet a matter of complete agreement. Becker disputes Deutschmann's statement that the vitreous is considerably richer in albumen than the aqueous, and cites as definitive Cahn's more recent analyses, according to which the composition of the two fluids is almost identical :—

	VITREOUS.	AQUEOUS.
Albumen - - - - -	0·074	0·082
Other organic substances -	0·071	0·148
Ash - - - - -	0·971	0·993
Water - - - - -	98·884	98·777

The intraocular fluids are extremely poor in albumen, and are thus closely allied to the cerebrospinal fluid. The reaction of the aqueous is alkaline, its specific gravity 1·009. The index of refraction for line D of the spectrum is, for the aqueous 1·3373, for the vitreous 1·3369.

In presence of senile cataract the aqueous humour has been found to contain a considerable excess of albumen. In a case of acute nephritis with exceptionally pronounced albuminuria, but with no cataract, the aqueous contained no excess of albumen. This tends to show that the excess of albumen present in cataractous eyes is the result of the degenerative changes in the lens, not a cause of them. Should it prove true that in presence of senile cataract the albumen in the aqueous is always increased in quantity, the change may reasonably be attributed to an abnormal diffusion of albumen from the degenerating lens.

(To be continued.)

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ON EXOPHTHALMIC GOITRE.

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I have the opportunity of adding two instances to the one reported by Dr. Story in the June number of this Review, in which Graves's disease has shown itself in two members of the same family; indeed, in one of the two families the number of cases is probably three, since a brother is subject to excited action of the heart and flushing. It is noteworthy that one of the cases occurred in a male; two, in fact, if the supposition just stated be correct. The disease is rare in males; nevertheless, it has fallen to my lot to meet with three cases in the male, out of 23 of which I have notes; one of the cases was in a man 34 years of age.*

The two instances which have suggested this communication are the following:—

I.—CASE 1. Miss H., aged 32, consulted me in March of last year, complaining of tremor, irregular flushes, lacrymation, and uncertain spirits. There was then some thyroid enlargement, but no proptosis. Her pulse numbered 160; the sounds of the heart were pure, but there was a sharp carotid bruit with considerable arterial pulsation; no bruit in the thyroid gland. I have no history of the access of the malady; the patient had long been subject to migraine. Her menstruation had ceased for a long period, but had returned just before her visit.

My personal knowledge of this lady lasted until November 25 of the same year. Her prominent symptoms were those of grave nervous disturbance, serious interference with the nutritive processes, violently excited action of the heart; the

* Thirteen of these 23 cases appeared in the "Medical Times and Gazette," September, 1876.

pulses sometimes uncountable, usually 160 to 170, and shortness of breath, even preventing her from walking. I was unable to make out any prominence of her eyes during her attendance, although she assured me, and reiterated her assertion, that her friends thought her decidedly changed in that particular. There was, however, great injection of the conjunctiva with a remarkably tearful state of the eyes, giving her face a very peculiar aspect. Her pupils were contracted, so that I could not use the ophthalmoscope; Graefe's sign was absent. The goitre increased considerably, chiefly in the right lobe, the girth of the neck gaining, in this manner, two inches. The rapidity of the heart's action never abated, and at a late visit I found the apex beating an inch beyond the nipple line; the impulse was firm and strong, the sounds remained pure.

The nervous disorder was marked by general tremor, which affected her speech, faintness, and great sense of weakness, much nervous irritability, and neuralgic pain. She perspired most profusely over her head and face; on one occasion unilateral sweating was noted. Flushing was constant; *tâches* were easily produced; her hair was falling off. The digestive organs were disturbed, vomiting was easily excited. There was frequent diarrhœa, at times much craving for food. Nutrition fluctuated remarkably: she had lost fourteen pounds during the preceding twelve months; on paying a visit of six weeks in the country she recovered three pounds, but lost flesh immediately on her return. During the latter part of her attendance she stated that she had regained eighteen pounds; she was obviously much stouter; three weeks later she was again becoming lighter. She is still in the same condition.

CASE 2. In the early part of this lady's attendance, a letter from Mr. Freer, her surgeon, informed me that "her brother had a most serious attack twelve years ago; he was then twelve years of age; the cutting of a large tooth in his case seemed to be an important factor. The goitre, the prominent watery eyes, the excessive cardiac action, the nervousness, were all very marked and prolonged in duration He eventually got well under iron and digitalis, free aloetics, and lancing the gums. His motions were the most remarkable I ever saw, offensive to

a loathsome degree, clayey and dry." In a second letter, at the present time, he tells me that during the last six months this patient is again suffering from the complaint in a milder form—increased prominence of the eyes, nervousness and excited cardiac action. Three epileptic seizures have happened from indigestible food.

He also is good enough to add the following interesting family history: the eldest brother is subject to *an easily excited state of the heart and (purple) flushing*. The father died suddenly of heart disease; a niece of the father lost, five years ago, many infants in succession from a neurosis—laryngismus stridulus; death sudden in three. With reference to the large tooth as an important factor in the case of this young gentleman, he writes—"I have in the past year had a most satisfactory case in a lady from a distance, aged 17, whom I speedily cured with the gum lancet."

I need hardly observe that these two instances of distant irritation influencing the disease agree with Dr. Fitzgerald's theory far better than with the sympathetic hypothesis.

II.—Emma B., aged 21, January 22, 1883, an in-patient of the General Hospital. She had low fever three years and nine months ago, and afterwards lost much flesh; about that time the thyroid began to enlarge, and the enlargement went on with especial rapidity during the last nine months. The size of the gland was subject to variation, undergoing increase after walking or after excitement. Proptosis began a year after the goitre had been observed, and became steadily worse; six months ago the eyes became much inflamed, and tears ran down the cheeks for several weeks. Palpitation has been present during most of the time, and distressing throbbing in her neck. Menstruation has been irregular during four years. The patient has become much more irritable lately, and during the fortnight preceding her admission she had four fits, apparently epileptic. Her eyes were very prominent; the goitre involved principally the right lobe of the thyroid, to a less extent the middle lobe.

CASE 2. The patient's sister, aged 25, came to the out-patient room on July 14th. She had no goitre, but she asserted

that she had felt a substance in her throat, rising badly, and choking her when she walked, during the last three years. (Was this hysterical, or did it point to some nervous change tending to local vascular excitement?) A change in the eyes is reported to have existed during the before-mentioned period (three years), and the assertion is emphatically supported by the patient's mother, who declares that her daughter's eyes used to be deeply set, like her own. I should not myself have detected any peculiarity in the patient's eyes, though they are certainly not "deeply set"; there may be indeed a little fulness. The pupils are of medium size. What connected the case with her sister's disease was the state of the patient's circulation. I was unable to count the pulse by reason of the indistinctness of the beat, but by the ear I counted 160 cardiac pulsations; there was no bruit, either in the cardiac region, or in the carotids.

The patient was subject to severe nervous excitement, at times to such an extent that she found it impossible to remain in the house, but felt compelled to go out of doors and walk about. Both she and her sister suffered from the sense of heat, so common an element in this singular malady. She had also vertigo and faint feelings; her nights were restless. She menstruated about every three months.

This case will be found to possess special interest in connection with a striking instance of Graves's disease, in which goitre and proptosis were both absent, to be hereafter described.

In connection with Dr. FitzGerald's important paper on a Central Lesion in Graves's disease ("Dublin Medical Journal," March, 1883; O. R. May, 1883, p. 148), I may remark that the sympathetic theory of the disease generally accepted was criticised adversely by Professor Vulpian ("Lecons sur L'Appareil Vaso Moteur," 1875, vol. 2), though without any alternative hypothesis being suggested. Vulpian based his objection chiefly on the discrepancy which existed between the results of experiment and the characteristic phenomena of the disease. Without denying the possibility of opposed

conditions of paralysis and "excitation" coexisting at the same time in different parts of the sympathetic system, he yet appealed against the probability of such a conjunction ; and in like manner he regarded the supposition of sustained "excitation" of a portion of the sympathetic, "through weeks and months," although it cannot be affirmed to involve an impossible condition, as very unlikely to happen ; and comments on the absence of dilatation of the pupil in a large proportion of the reported cases. He quotes the instances in which lesion has been discovered in the sympathetic ganglia, but opposes to them the other cases in which no morbid change could be found ; and questions the alleged cure of the malady by galvanising the sympathetic. It may be added that Vulpian does not accept the vascular theory of epilepsy and of sleep.

The affection of the vaso-motor centres, on the theory advocated by FitzGerald, must be of variable extent in different cases, and in some cases must be extensive. Stellwag, as quoted by FitzGerald (p.209), speaks especially of the vaso-motor centre of the head and neck, and with this selection the preference given to this region for the remarkably profuse perspirations to which some patients are liable fully coincides ; but Stellwag also includes other parts of the body. The perspiration is sometimes general ; in one of my cases it was unilateral. Considerable vascular irritability, indicated by flushes of the head and face, and conjunctiva particularly, but also of other parts, and by the exaggerated production of *tâches*, must be referred to the same cause ; and probably the tendency to diarrhœa, which is so marked a feature in certain cases. In a lady now under my care, the patient was in the habit of passing from twenty-six to thirty stools in the twenty-four hours during the three concluding months of last year ; the symptom has slowly yielded. She described the alvine evacuations as consisting of a white fluid without fœcal odour, which sometimes poured from her.

There is one very remarkable phenomenon presented by many cases of Graves's disease, which, at first sight, might seem to belong to vascular changes, but which is probably a sensitive neurosis; I refer to the sense of heat, amounting sometimes to intolerable burning, which is complained of by some patients, without elevation of the surface temperature, a sensation which compels them to cast aside their clothing.

This phenomenon, which, however, is not peculiar to the disease under consideration, was combined in one of my patients with an extraordinary power of resisting a low degree of external temperature. The case was one of great severity; the complaint of heat was urgent, though the cutaneous temperature was not raised (I have to regret that I did not take the temperature of the rectum); the patient could hardly endure the lightest clothing by day or by night, and refused a fire in her bedroom during one of our most severe winters. On one particular day at Christmas she went out clothed only in a thin gown and a chemise, and this dress with a woven vest constituted her ordinary attire; by night she lay with merely a sheet and a thin blanket on her bed, and frequently threw off the latter article; and this when sleet and snow were driven outside by a keen north-east wind. I have an observation that five months after my attendance began, in May, she felt cold for the first time, and drew more clothes over her bed at night.

This last observation suggests the probability that, in Graves's disease, serious nervous derangement extends more widely than is implied by the prominent symptoms, which are usually regarded as characterising the malady. There are two groups of symptoms especially occupying a very prominent place in the clinical history of the disease which must be taken into account in assigning a pathological foundation; I allude to marked and general nervous disturbance and to profound derangement of the nutritive function indicated by emaciation, or in some instances by singular fluctuation

in body weight. The nervous derangement is prominent in the descriptions given by writers on the disease,—Stokes, Trousseau, Laycock, Chcadle, and others. “The patient’s temper,” observes Trousseau, “is so altered that the persons about her can hardly put up with her irritability, her want of grateful feeling, her exacting ways;” profound mental impressions, fright especially, grief, excessive mental labour, or other causes morbidly influencing the nervous system, are mentioned by Dr. Laycock as predisposing to the disease, and “emotional and similar mental states as exciting causes.”

It need hardly be said that the disease we are considering is not the only nerve-disorder which exhibits serious general derangement united with local symptoms. Chorea affords a striking example. Moreover, some exaggerated forms of nervous or moral disorder present in Graves’s disease are to be referred to hereditary tendency, or to previous mental impressions. My cases afford evidence of this. Still these disorders appear as closely connected elements of the disease, and elements which present the same variations in character, in intensity, and in frequency, as do the other elements.

Of my 23 cases, in two the reports cannot be used with reference to this question of emotional and moral perversion. In six, general nervous derangement was specially stated to have been absent, or none is mentioned; but in 15 it was of a decided character; and in eight of the 15 it even overshadowed the other symptoms. In one patient passionate irritability, great wilfulness, and hysteric outbursts, were combined with obstinate sleeplessness. I select this case for special notice because moral treatment produced a marked effect upon the general nervous disorder, and seemed to lead up to the recovery from the fundamental disease which, with much difficulty, was finally effected. The beginning of amendment dated from the time when the patient was kept closely in two rooms apart from the rest of the family. The phenomena presented by

the other cases varied somewhat, but were of an urgent character in all; excessive morbid irritability was the symptom most in common; general tremor, dislike of strangers, obstinacy, depression and hypochondria, and loss of self-control, have all places in the descriptions given. One patient had had a single epileptic fit, another four.

In the other seven cases the disorder was of the same character, but was carried to a less degree of severity. Irritability and nervousness constitute the condition most generally spoken of; also an emotional state or hysteric tendency. Two of the seven patients were males; the nervous condition of the third male in my collection of cases is not mentioned.

Even more striking, though of rather less frequent occurrence, are the instances in which the nutritive functions have been deeply affected. In six patients emaciation attained a very advanced stage, in some of them with very remarkable rapidity. Singular fluctuations in the condition of nutrition were also reported. In one case emaciation made such alarming progress as to reduce the patient almost to the condition of a skeleton in the course of six weeks; the appetite was capricious, but the patient did not refuse food; recovery from this state of attenuation when once it set in was even more remarkable from its rapidity; and during its progress the patient exhibited an equal extreme of the opposite condition—great obesity with an inordinate appetite. It must have been two or three years before she returned to her ordinary standard of nutrition. Another patient, also the subject of a severe form of the disease, must have lost nearly half her weight between May and December of last year. She fell from a comely condition of *embonpoint* to one of advanced emaciation. The singular fluctuation in nutrition is illustrated by the first case in this paper.

In 12 patients it is either stated directly that no loss of flesh had been experienced, or no mention is made of such an occurrence having taken place.

It is also to be particularly remarked that no relation appears to have existed between the degree of nervous and nutritive derangement. Among the eight cases of severe neurotic disorder there were but three in which nutrition had been seriously depressed, whilst in four either nutrition was stated to have been unaffected, or no mention is made of any change of this character. The six cases in which general nervous disturbance was either absent or existed to a slight degree presented three in which emaciation had attained considerable advance.

(To be continued.)

A SERIES OF ELECTRO-MAGNET CASES.

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HOSPITAL.

The following cases occurred during the last six months in the clinique of the Manchester Royal Eye Hospital; the first three in the practice of Dr. Glascott, and, strange to say, all on one day; the others in the practice of Dr. Little:—

REMOVAL OF CHIP FROM IRIS BY ELECTRO-MAGNET.

William Cross, aged 24, was struck on the right eye by a piece of metal while using hammer and chisel. On admission, four and a half hours afterwards, a minute shining fragment of steel was seen embedded in the inner part of the iris, quite close to the pupillary edge; there was a small faintly-marked cut in the cornea, and also a slight wound of the lens capsule; the lens showed commencing opacity. The media were otherwise clear, and the eye was quiet.

On the following day a small incision was made in the cornea at its inner side, through this the needle of the electro-magnet was introduced, and the chip easily drawn into the corneal wound, from which position it was removed by means of fine forceps. A little iris, which had been bruised, was then excised. The patient was discharged in one week, the

lens absorbing quietly. Discission was performed one month later, a clear pupil and good vision resulting.

SUCCESSFUL REMOVAL, BY MEANS OF ELECTRO-MAGNET, OF CHIP
OF STEEL FROM VITREOUS.

Jas. Swais, a fitter, aged 38, when forging a steel key, was struck on the right eye by a splinter of metal. When seen at the hospital two hours afterwards, there was a clean meridional cut of the sclera about one-third of an inch from the outer corneal margin; the edges of the wound were in close apposition, and the eye was quite quiet. On examining by the ophthalmoscope a flat shining scale of metal was seen lying on the retina, at some distance from the outer side of the optic disc, and below it was a clot of blood.

On the following day the wound in the sclera was enlarged, and converted into a T shaped incision by a second cut; the electro-magnet needle was then inserted, and gently thrust to the situation of the foreign body, and held in this position for some little time, but no success attended this proceeding. The unarmed magnet was then held in close contact with the scleral wound for about half a minute; this also proving of no avail both eyes were bandaged up and the patient was sent to bed.

We explained to the patient, who was a very intelligent man, that the want of success was owing to the needle not being sufficiently bulky, and that at the next attempt we should have constructed a stronger one. He was very impatient of delay, and offered to get one made in a few hours if we would let him know what was wanted, and we at once complied with his request. He was as good as his word, and presented us with a beautifully finished needle of soft iron. It was as thick as a good-sized crow quill, but slightly flattened. With this instrument, on the sixth day after the first attempt, a precisely similar operation was undertaken, the patient being on this occasion chloroformed, and permission having been obtained to enucleate the eye if necessary. This second attempt was successful, the magnet, after being kept in for about half a minute, was withdrawn, and the piece of steel was found adherent to it. The scleral wound healed kindly, and at the end of two and a half months it was noted that the eye was

free from all irritation and looked as well as the other, but of course the vision was seriously affected, only amounting to counting fingers. There was a large separation of the retina.

CHIP OF STEEL EMBEDDED IN SCLEROTIC AT BACK OF EYE.
UNSUCCESSFUL ATTEMPT AT REMOVAL WITH ELECTRO-
MAGNET.

John Holden, aged 34, a striker by occupation, was struck on the right eye by a splinter from the anvil; he came to the hospital three-quarters of an hour after the accident. There was a clean cut in the sclera about one quarter of an inch in length, situated one-third of an inch downwards and outwards from the edge of the cornea. A little vitreous was escaping; the eye was otherwise quiet and the sight good. With the ophthalmoscope one detected a black line corresponding in position with the wound in the sclerotic, and on making the patient look well down and outwards a sharply defined glistening fragment of metal could be seen fixed against the back of the eye. The patient was admitted into the house, the eye carefully watched, and the fragment of metal frequently examined, and its position noted accurately. One week from the date of the accident the patient was chloroformed, and a similar operation to that in the previous case was undertaken. The large-sized needle was employed, but though the foreign body must have been touched several times, no success was obtained. The patient was discharged one month from the date of accident, the state of affairs being explained to him. The eye was full of blood, and the tension was somewhat below that of the other eye; there was no pain. It was resolved to watch the case, and enucleate when any indications presented themselves. Six weeks later the eye began to give much pain; it became red and watered; as nothing was to be gained by waiting longer it was enucleated. On opening the globe the explanation of the failure of the attempt at removal was evident; a sharp arrow-headed piece of steel was found firmly and deeply embedded at the back of the eye, about half an inch to the outer side of the optic nerve; and corresponding in position to this on the outer surface of the sclerotic was a bluish mark showing how deeply impacted the fragment was. The foreign body was about a line and

a-half in length, and on being brought within half an inch of the electric needle was easily attracted.

SPLINTER OF METAL IN LENS. REMOVAL BY ELECTRO-MAGNET.

Joseph Harrop, 36, a joiner by trade, was admitted into the hospital 24 hours after an accident to his left eye, a piece of metal having penetrated the cornea. One end of the splinter was deeply sunk into the opaque lens, the other end projected forward to the cornea, which showed a small wound of entrance. There was very acute iritis, yellowish haze in cornea, a good sized anterior chamber, turbid aqueous, and intense injection of globe. He had poulticed the eye energetically.

A small linear section was made in the upper part of the cornea, and through this the electric needle was inserted. The chip at once attached itself, and was speedily and safely drawn out. A small prolapse of iris was excised. The eye did not recover itself, suppuration of the cornea took place, and the globe had to be removed two and a half months after the date of accident on account of irritation and impending danger to its fellow.

CHIP OF METAL ON IRIS. SUCCESSFUL REMOVAL BY MEANS OF ELECTRO-MAGNET.

A sewing machine fitter, aged 34, came to the out-patient department on the morning of December 18th, saying he had got a blow on the left eye from a chip of metal while at his work half an hour before. A small, sharp-angled, glistening piece of metal was at once detected lying on the outer part of the iris, midway between the pupil and the ciliary attachment. He said that there was only momentary pain, and that he could see quite well; but had thought it best to come at once to the hospital, as one of his mates said he could see the piece of metal.

An hour afterwards a small incision was made with a straight broad needle in the outer sclero-corneal junction. The needle was quickly withdrawn, the aqueous being retained. The electro-magnet needle was then carefully introduced into the anterior chamber, the little piece of metal at once attached itself and was easily and safely withdrawn. The patient was perfectly steady; no prolapse of the iris occurred. He was

permitted to go home in the course of an hour with a bandage over the eye. He was seen as an out-patient the next six mornings; the eye remained quiet and retained normal vision.

CHIP OF IRON ON LENS CAPSULE. SUCCESSFUL REMOVAL WITH
FORCEPS AFTER FAILURE OF ELECTRO-MAGNET.

A man, aged 39, a miner in North Lancashire, was admitted into the hospital on October 20th, 1882. He told us that he had got a blow on the right eye two days before when "picking" in the mine.

A round, dark, non-lustrous body, about the size and shape of a pin's head, could be seen lying in the lower part of pupil; the aqueous had escaped, so that the foreign body was touching the cornea in front, the lens capsule behind, and the border of the iris below. There was a faint scar in the cornea just below the centre indicating the point of entrance of the foreign body. The pupil, as might be expected from loss of aqueous, was a little narrower than that of the other eye; there was no appearance of iritis, and only the faintest superficial injection of the conjunctiva of the globe. The refractive media were clear. The patient had no pain in the eye, and the vision was good.

A flannel roller bandage was applied, and the patient sent to bed. By the next morning the anterior chamber was re-established. On being questioned, the patient said he thought it was a fragment of the iron ore, and not a piece of his pick that was lodged in the eye. He added that the ore he worked was the red iron ore.

One week afterwards, the eye remaining quite quiet, a similar operation to that in the previous case was attempted, the incision this time being made well in the cornea and below. The magnetic needle, however, failed to withdraw or even to attract to any appreciable extent the foreign body; and on applying the broad end of the electro-magnet, without the needle, directly on the corneal wound, no better success was obtained. A fine pair of curved iris forceps was introduced, and after a little careful manœuvring the fragment was secured and safely withdrawn. A small piece of iris which prolapsed was excised. The eye made a good recovery, there was no wound of the capsule; and the last account, obtained only a fortnight ago

from the medical attendant, was that the eye was quite strong and the sight almost perfect.

The fragment must have been after all a piece off the pick, for it was found after removal to be easily attracted by the magnet, the black or magnetic iron ore being the only iron ore that possesses this property. It is astonishing how very slight an impaction will sometimes defeat the object of the magnet.

PIECE OF METAL EMBEDDED IN IRIS. REMOVAL BY FORCEPS
AFTER FAILURE OF ELECTRO-MAGNET. LENS WOUNDED.

J^{no}. *Hamer*, aged 26, labourer, was breaking stones, when a piece off the hammer struck his left eye. He did not come under our notice till one week after the accident, when the following state of affairs was noted. Deep injection of eye; a faint scar on the upper part of the cornea; a piece of shining white metal embedded in upper and inner segment of the iris; iris acutely inflamed. The upper edge of the metal was presenting against the back of the cornea, the lower edge was pointing downwards and backwards, and the sides were overlapped by iris. There was no wound of the lens apparent, and patient counted fingers readily.

The same day an attempt was made by Dr. Little to remove the offending piece of metal by inserting the magnetic needle through an incision made by a bent keratome at the upper and inner quadrant of the cornea in the sclero-corneal junction. It was very soon apparent that this proceeding would not succeed, so curved forceps were tried, but great difficulty was experienced in getting a good hold owing to the restlessness of the patient, the burying of the edges of the metal, and the blood in the anterior chamber. The incision was continued, by means of a Graefe's cataract knife, across the upper part of the cornea, and a piece of iris having been excised the foreign body was successfully removed by the forceps. It proved to be larger than appeared at first examination, being a square flat plate quite one quarter of an inch in each direction. The patient was kept in bed in a darkened room with a bandage over both eyes, and the recovery, though somewhat tedious, did not necessitate any active treatment beyond hot camomile fomentation. Atropine was used very sparingly. When patient left the hospital, three weeks from date of operation, there was no iritis, the eye was quiet, the lens opaque, and breaking up well.

J. GRASSET (Montpellier). Crossed Amblyopia and Hemianopia in Cerebral Lesions. *Recueil d'Ophthalmologie*, March, 1883, p. 130.

The purpose of this article is to show that Charcot's diagram of the course of the optic fibres does not accord with clinical facts, and to substitute for it one by which all forms of cerebral amblyopia can, hypothetically at least, be satisfactorily accounted for.

Von Graefe, accepting the fact of a semidecussation at the chiasma, and recognising no further decussation, asserted that a lesion of one cerebral hemisphere could affect vision only in the form of hemianopia, monolateral or bilateral; and that complete amaurosis, whether of one eye or of both, implied either that the cerebral lesion was bilateral, or that it was complicated with changes in the optic nerves or discs.

Charcot discovered that hemianæsthesia, whether of the hysterical type or due to actual cerebral lesion, is accompanied not by hemianopia but by crossed amblyopia—concentric contraction of the field on the side opposite to the lesion. He concluded that while a lesion in the course of the optic tract caused hemianopia, a lesion in the cerebral hemisphere caused crossed amblyopia; and in order to explain this new relation anatomically, he constructed the well-known diagram in which those fibres which do not cross over at the chiasma cross higher up, namely, at the corpora quadrigemina, so that ultimately a complete crossing of the fibres from each retina to the hemisphere of the opposite side is effected. This diagram became classical, and was all-sufficient so long as the belief held ground that a lesion of one cerebral hemisphere produced blindness, partial or complete, of the opposite eye. But this again has proved contrary to fact.

The objections to Charcot's scheme rest both on experimental physiology and on clinical observation. Munk found in the dog and the monkey a visual centre in the cortex of the occipital lobe of the cerebrum, and he found that destruction of this centre on the one side caused not complete blindness in the opposite eye, but homonymous hemianopia. He found further that the centre for the crossed fibres is distinct from the centre for the uncrossed fibres, so that by the removal of one or other of these areas it was possible to produce a

hemianopia of one eye only. These observations apply with certainty only to the animals experimented on, but clinical experience proves their applicability to man also. Omitting cases which afford no *positive* evidence (*e.g.*, hemianopia occurring with migraine and with hysteria), Grasset collates thirteen examples of homonymous hemianopia in which a lesion of the cerebral hemisphere without lesion of the optic tract was found after death. In some of these the lesion was not sufficiently limited in extent to indicate the precise seat of the visual centre; in two (*vide* O. R., vol. i., p. 251) it was clearly localised in the median surface of the occipital lobe near to its posterior limit.

By the side of these he places several cases of hemianæsthesia conjoined with hemiplegia, hemichorea, or hemiathetosis, with crossed amblyopia, but no hemianopia, and with intra cerebral lesion proved by post-mortem examination. The neighbourhood of the internal capsule appears to have been the usual seat of the lesion.

These facts prove the insufficiency of Charcot's scheme, also of a later scheme offered by Féré. The latter places the central fibres of the retina in a distinct bundle by themselves, and thus explains the preservation of central vision in crossed amblyopia, but it does not explain the loss of vision in crossed amblyopia, for at no spot are the fibres from the two halves of the same retina united.

In addition to Charcot's second decussation, Grasset suggests a *third decussation*. His scheme is this:—

1. The internal fibres cross at the chiasma, whilst the external fibres pass uncrossed into the tract of the same side.
2. The external fibres cross further back (say at the corpora quadrigemina), so that the crossing of the whole of the fibres is then complete, and each internal capsule contains the whole of the fibres of the opposite eye.
3. The external fibres cross back again beyond the internal capsule, so that ultimately each occipital lobe receives the fibres from the corresponding halves of the two retinæ—the external fibres of its own side, the internal fibres of the opposite side.

By this scheme it is possible to explain each type of visual affection; thus, lesion of the tract will produce hemianopia; lesion in the internal capsule, crossed amblyopia; and lesion

in the cortex, hemianopia. And further, if the cortical centre for the peripheral fibres be distinct from that for the central fibres, as it is asserted to be, we can also explain cortical hemianopia with and without retention of central vision.

The corpus callosum is suggested hypothetically as the seat of the third decussation. It is not impossible that a certain number of the fibres issuing from the internal capsule may pass upwards to cross by the corpus callosum into the opposite hemisphere, and there bend backwards to the occipital lobe.

According to this scheme the internal and the external fibres of the optic nerve pursue a different course in the brain; the former decussate, once for all, at the chiasma, and terminate in the hemisphere opposite to the eye from which they spring; the latter undergo a double decussation, which brings them, after an incursion into the opposite hemisphere, back again to the side from which they emanate. As lessening the apparent improbability of such an incursion, Grasset reminds us that Landouzy has suggested a similar hypothesis in connection with other nerves in order to explain conjugate deviation of the head and eyes.

It is interesting to compare Grasset's hypothesis with that now suggested by Sharkey (*vide* p. 345). The latter, if we understand it aright, seems to present this difficulty: If the cortical centre adopted by Sharkey from Charcot's diagram correspond to the central area only in the opposite retina, we ought, in some cases of cortical lesion, to meet with a crossed *central* amblyopia, and we ought never, however extensive a cortical lesion may be, to find it producing homonymous hemianopia of the entire retinal halves. But a crossed central amblyopia has not been observed in such cases, and in one case of cortical hemianopia (O. R., vol. i., p. 252), the line of demarcation is described as vertical and sharp. Grasset's scheme, on the other hand, appears capable of explaining cortical hemianopia both of the peripheral and of the entire type.

Speaking physiologically the two left retinal halves may be regarded as a single complete organ, for vision towards the right, and the two right halves as a single complete organ for vision towards the left; if we may speculate by the light of analogy with motion and sensation, it seems, we think, more probable that each of these organs should be represented in its

entirety in the opposite cerebral hemisphere (Grasset) than that it should transmit its peripheral impressions entirely to the one side and its central impressions partly to the one and partly to the other side (Sharkey). Both schemes are, of course, entirely hypothetical at present.

H. HÖLTZKE (Erlangen). Experiments upon Intraocular Pressure. *Von Graefe's Archiv.*, XXIX., II., p. 1.

The Author details the results of an extended series of manometrical observations undertaken in the physiological laboratory, at Erlangen, upon the pressure of the aqueous humour in cats' eyes under the influence of different therapeutical agents. A modification of Leber's canula was used to communicate with the anterior chamber, and a special double manometer was employed in order to guard against the errors occasioned by escape of aqueous into the canula or by entrance of water into the eyeball.

The principal object of the experiments was to ascertain the influence of eserine and atropine upon intraocular pressure, a question upon which opposite opinions are still entertained, and which Höltzke's observations place upon a more satisfactory basis than any previously recorded experiments have afforded.

His conclusions are—(1) The dilatation of the pupil caused by atropine is accompanied by an increase of the intraocular pressure, and the contraction caused by eserine is accompanied by a decrease. (2) Eserine increases the intraocular tension, but the latter proposition is not incompatible with the former.

Most of the experiments were made upon the animal's two eyes simultaneously, a method the advantages of which are obvious.

The results of the experiments are exhibited in three tables, the pressure being indicated by the height of the mercurial column in millimeters.

1. Average of the *highest pressures* obtained in the several experiments :—

	mm.
a. In the whole of the 27 experiments	31·8
b. Under influence of morphia (4 experiments)	23·0
c. Under influence of curare (3 experiments)	17·66
d. Under influence of chloroform (20 experiments)...	33·75

e. Under atropine, with dilated pupil	mm.
(chloroform narcosis)	35'2
f. Under eserine, with pupil of various sizes	
(chloroform)	37'4
g. Under eserine, with pupil dilated (chloroform) ...	42'25
h. Under eserine, with pupil contracted (chloroform)	32'5
i. Without eserine or atropine, and pupil of various sizes (chloroform)	34'3
j. Without eserine or atropine, pupil dilated	
(chloroform)	35'0
k. Without eserine or atropine, pupil contracted	
(chloroform)	33'33
2. Average of the <i>lowest pressures</i> obtained in the several experiments :—	
a. In the whole of the 27 experiments	19'3
b. Under influence of morphia (4 experiments)	14'0
c. Under influence of curare (3 experiments)	14'33
d. Under influence of chloroform (20 experiments)...	21'1
e. Under atropine, with dilated pupil (chloroform) ...	22'4
f. Under eserine, with contracted pupil (chloroform)	21'14
g. Without atropine or eserine, pupil of various sizes (chloroform)	19'14
h. Without atropine or eserine, dilated pupil (chloroform)	21'0
i. Without atropine or eserine, contracted pupil (chloroform)	17'75
3. Average pressures obtained in the several experiments, being the arithmetical means of the highest and lowest pressures given in tables 1 and 2.	
a. In the whole of the 27 experiments	25'6
b. Under influence of morphia	18'5
c. Under influence of curare	16'0
d. Under influence of chloroform.....	28'4
e. Under of atropine (chloroform)	28'8
f. Under influence of eserine (chloroform)	29'25
g. Without atropine or eserine (chloroform).....	26'7
h. Without atropine or eserine, pupil dilated (chloroform)	28'0
i. Without atropine or eserine, pupil contracted (chloroform)	25'5

The author states that nothing more decided and constant could be imagined in an experiment of the kind than the increase of pressure as the pupil dilated, and the decrease as the pupil contracted. The action of eserine in raising the pressure was shown by the fact that the highest pressure very frequently (in about half the cases) appeared on the side where eserine had been applied. The highest figures of all (44 mm., 52 mm.) were found in eserine eyes with wide pupils. In one case of eserine with a contracted pupil the tension was 54 mm., but in this instance the cornea was somewhat bruised by a blunt canula, and myosis was present during the whole experiment. Excluding it from the list, the average of the highest pressures under the influence of eserine, with contracted pupil, is only 25.33 mm. instead of 35.5.

The tables establish the general rule that when the pupil contracts the pressure falls, and that when it dilates the pressure rises. In the few exceptional cases in which a high pressure was observed, with a small or medium pupil, a careful review of the figures showed that this condition of the pupil had been present throughout the whole of the experiment, and in like manner where a low pressure coexisted with a large pupil, dilatation existed throughout.

The tables show further that the highest pressures of all occur under the influence of eserine; thus eserine eyes with large pupils had a higher pressure by 7 mm. than eyes with complete atropine mydriasis; and, even disregarding the condition of the pupil entirely, the average of the highest pressures in eserine eyes was 2 mm. higher than that in atropine mydriasis. With the development of myosis the pressure decreases, so that the average of the highest pressures in eserine eyes with contracted pupils is lower than that in eyes with contracted pupils not under eserine. This compels us to distinguish two opposite effects arising from the influence of eserine:—1. A decrease of pressure due to contraction of the pupil; 2, An increase of pressure produced in another way. From the time of the application of the eserine and for three-quarters of an hour or more afterwards, the pressure increases, and may attain a height of 37, 44, and even 52 mm.; then, as contraction of the pupil becomes fully established it decreases considerably; and, later still, as the myosis passes off, it returns to its former height.

In this connection we would call attention to von Reuss's observations upon the action of eserine in the human eye (von Graefe's Archiv., xxiii., 3). He found that spasm of accommodation occurred generally before contraction of the pupil, often so early as five minutes after instillation; and that the myosis persisted for a considerable time after the accommodation had returned to its normal condition, which took place in from one to two hours after instillation. The decrease which he observed in the radius of corneal curvature began a little later than the accommodative spasm, and ceased when the spasm was over.

The conclusions which Hölzke draws are as follows:—

1. Eserine raises the intraocular pressure considerably, but the myosis which it induces acts in the opposite direction, and to such an extent that ultimately the pressure is reduced below the normal.

2. Atropine has no direct power to raise the pressure, but the dilatation of the pupil which it induces produces a considerable increase.

3. Under physiological conditions the pressure rises with dilatation, and falls with contraction of the pupil.

Vascular pulsation was observed to cause pressure-changes in the eye, varying from a hardly perceptible movement of the mercury to a maximum oscillation of 2 mm.; the effect of the pulsation was more marked when the intraocular pressure was high than when it was low.

Respiratory efforts caused an oscillation amounting to $\frac{1}{2}$ mm.

Compression of the aorta raised the pressure to the extent of 6 to 10 mm.

The pressure in the vitreous chamber could not be measured with the apparatus employed, the consistency of the vitreous preventing it from passing along the canula.

Division of the cervical sympathetic caused contraction of the pupil and a fall of pressure amounting at most to 6 mm. Electrical stimulation of the upper cut end caused wide dilatation of the pupil and a corresponding rise of pressure.

The results of Hölzke's experiments with eserine and atropine agree entirely with conclusions previously arrived at by other observers. They confirm the statement formulated in

an early number of this Review that the well-known effects of atropine and eserine in certain cases of glaucomatous tension depend essentially upon dilatation and contraction of the pupil, and also that eserine when it fails to lower the tension by myosis, is apt to increase it by its influence upon the blood vessels (*vide* "The Action of Atropine and Eserine in Glaucoma," O. R., vol. i., pp. 79, 83, etc.) The same conclusion has been clearly expressed by Pflueger (Bericht. Heidelberg, Ophth. Gesell., 1882, p. 130). They do more than any previous evidence has done to show the extent to which eserine actually does, apart from its action as a myotic, increase the tension of the eye, and also to show that dilatation and contraction of the pupil are accompanied by pressure changes in the non-glaucomatous as well as in the glaucomatous eye.

In order to estimate the importance which should attach to the pressure-changes observed in these experiments, it is necessary to compare them, if possible, with the pressure-changes which we recognise clinically as conditions of disease. Hölzke found the average pressure in the cats' eye during chloroform narcosis, but not under atropine, to be 26.7 mm. of mercury (table 3, 9), and this agrees with the estimates of other experimentors. The highest point to which eserine raised it was on the average 42.25 mm. (table 1, 9), the highest point in any experiment being 54 mm. According to experiments published by Priestley Smith the normal pressure in the human eye is about 25 mm. (others place it a little higher), and $T + 1$ begins at about 45 mm. (*vide* "Glaucoma: its Causes, etc.," 1878, p. 99). From this it would seem that eserine is able, *in the absence of myosis*, to raise the pressure in the cats' eye by an amount which would correspond clinically to a rise from the normal standard to $T + 1$, or even higher. In Hölzke's experiments "a concentrated watery solution of salicylate of eserine" was employed, a stronger application probably than is ever used in practice. As a matter of fact, a distinct increase of tension after the use of eserine is seldom, if ever, to be discovered clinically, unless it be occasionally in a case of glaucoma with irresponsive pupil. It is manifest, however, that these experiments give additional importance to the rule, that the strength of the preparation and the frequency of its application should be the minimum which is sufficient to contract the pupil and to keep it contracted.

OTTO BECKER (Heidelberg). The Anatomy of the Healthy and Morbid Lens.

(Continued from page 312).

Chapter V. General Pathology and Pathogenesis.—It has been generally assumed that the formation of cataract depends entirely upon retrogressive changes; it is now clear that it is associated also with progressive changes—abnormal cell-production in the capsular epithelium.

1. *Cause of the Abnormal Cell-growth in Senile Cataract.*—Under normal conditions the multiplication of the cells is held in check by the pressure which the capsule exerts upon its contents. The amount of this pressure depends upon the balance between the growth and the sclerosis of the lens-fibres. The addition of new cells and fibres, acting alone, would constantly enlarge the lens, their physiological degeneration acting alone would diminish it; in the healthy lens the former process has a greater effect than the latter, and a gradual enlargement continues even to extreme old age. In the lens which is about to become cataractous, sclerosis goes on faster than usual; the reduction of volume causes a reduction of the intracapsular pressure, and thus the ordinary check upon the proliferation of the capsular epithelium is lessened, and a quickened cell-growth ensues.

Pathology supplies us with other examples of abnormal cell-growth following the removal of the pressure exerted by adjacent tissues. Thus, in adipose tissue undergoing atrophy, Flemming found very constantly an active division of nuclei and fresh cell-growth. Thiersch connects the formation of epithelial cancer, in a similar manner, with senile atrophy of the skin. He argues that the degree of pressure which is exerted by any one part upon the surrounding parts is dependent upon its capacity for taking up nutrient fluid and for proliferation; hence, when any tissue loses its normal moistness and proliferative activity it exerts a diminished pressure upon its surroundings, and if in spite of this atrophic condition some of its cells still retain an undiminished vitality, these latter being released from restraint begin to proliferate.

11. *Cause of the Abnormal Cell-growth in consecutive Cataract.*—Under the term consecutive cataract are included not only all

cataracts, whether partial or total, caused by other diseases of the eye, but also cataracts originating in general disorders. The only positive example of the latter kind is the cataract of diabetes mellitus.

In diabetic cataract we have an abnormal constitution of the nutrient fluid as the most probable cause of the abnormal cell-growth. The volume of the lens is increased by an increased imbibition of fluid, a large portion of which enters, not in the normal direction, but by diffusion through the anterior and posterior capsule.

In cataracts which occur secondarily to diseases of the posterior hemisphere—choroidal cataracts—there is usually great proliferation of the capsular epithelium, and this whether the lens still remains surrounded by the fluid media or is in contact with organised tissues such as detached retina, tumours, false membranes produced by inflammation, or adherent iris. The cause of the abnormal cell-growth is probably the morbid nature of the nutrient fluid. In anterior polar cataract the pupillary area of the anterior capsule comes into relation with the secretions from the ulcerated cornea, and in this area only does the capsular epithelium proliferate. Here we have a nutrient stream abnormal in direction and morbid in constitution; moreover, the capsule in the affected area is weakened and offers a diminished resistance to the process of cell-multiplication beneath it.

Capsular cataract is commonly confined to the pupillary area of the anterior capsule, but sometimes it originates in other parts of the capsule, and occasionally extends over the whole of it. These varieties are doubtless attributable to differences in the direction and localisation of the morbid nutrient stream. Some of the shrivelled cataracts met with in newly-born and young children are nothing but thick capsular-cataracts—*i.e.*, proliferated capsular epithelium—enclosed in the folded capsule. The fact that the growth of capsular cataract is always limited in extent—that there are no lens-tumours—appears to show that the proliferative process checks itself by the products of its own activity, as in some other instances of cell-growth.

The *retrograde* changes which accompany the formation of cataract have been already noticed. They consist in atrophy

of the fibres with consequent sclerosis of the lens-substance and demarcation of the nucleus; in the peripheral fibres, fatty degeneration also; in the capsular cells, atrophy, hydrops, colloid degeneration, and calcification.

(To be continued).

INTERNATIONAL MEDICAL CONGRESS.

COPENHAGEN, 1884. SECTION FOR OPHTHALMOLOGY.

The following is the list of subjects proposed for communications and for discussion:—

1. The value in practical ophthalmology of examination of the Light-sense.
2. The theory of Colour-sense.
3. What do we know about the causes, the nature, and the prevention of Myopia?
4. Is Concomitant Squint the result of a fault of innervation or of a muscular anomaly?
5. What practical importance has the so-called Insufficiency of the eye-muscles?
6. The most recent experiences with regard to Antiseptic treatment in eye diseases.
7. Has the introduction of the Metric System proved a progress or not?
8. The best treatment in diseases of the Lachrymal Apparatus.
9. With what degree of precision can we determine the Refraction with the Ophthalmoscope?
10. On Glaucoma.
11. On Amblyopia and anomalies of the Movements of the eye, consequent on Traumatic Lesions of the surroundings of the eye.
12. Refraction in newborn children.
13. On some forms of Keratitis, to which hitherto little attention has been paid.
14. Do we possess any sure means of treating Ophthalmoblennorrhœa in its first stage?
15. What ought we to exact as to Seamen's Vision?
16. On "Massage" as a treatment of eye diseases.

Adopted from the London Programme:—

17. Contributions to the Physiology and Anatomy of the eye.
18. Foetal diseases of the eye.
19. Malformations of the human eye.
20. On the nature and treatment of Scleritis.
21. On the best method of examining Astigmatism.

Suggestions for changes in, or additions to, this provisional programme are invited, and should be sent before November 1st of this year, if possible, to Prof. Dr. E. Hansen Grut, President of the Organising Committee for the Section of Ophthalmology, or to Dr. V. Krenchel, Secretary, Copenhagen.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM,

THURSDAY, OCTOBER 11TH, 1883.

JONATHAN HUTCHINSON, F.R.S., President, in the Chair.

Reported by DAWSON WILLIAMS, M.D.

The President, in opening the fourth session of the Society, announced the receipt by the Council of a most generous and munificent offer from the late President. Mr. Bowman, knowing that the Society was embarrassed by the demands made upon its funds by the rent of the admirable premises which it now occupied, had generously offered to defray the cost of fittings necessary for a proposed museum and library, and to make a gift annually, for twenty years, of £50. The Council had had, for some months before Mr. Bowman's offer was made, and wholly unknown to him, a proposition under consideration to recognise his pre-eminent position by founding a lectureship, to be known as the Bowman Lecture. It was intended that a Bowman lecturer should be appointed each year, and invited to prepare a critical summary of the best extant information upon some special subject to be approved of by the Council of the Society. It was also intended to form a library of reference, as well as a collection of instruments and appliances.

President's Address.—In an interesting and highly suggestive address the President urged that in addition to its first and principal duty—the improvement of ophthalmic knowledge—the Society might take up another kind of work, only second to it in importance, namely, the systematic and strenuous endeavour to diffuse rapidly amongst the profession at large, for the prompt benefit of patients universally, the knowledge which it possesses and new knowledge which may be obtained. This suggestion related particularly to what may be named every-day therapeutics. It is obviously quite possible that the knowledge

of diseases of the eye may be cultivated by a few up to a point of very high excellence, and with great finish of detail, and yet remain a possession of the specialist, and benefit but little the family practitioner and the public his patients. In some degree this state of things is unavoidable, and in some departments of practice, such for example as the correction of astigmatism and the use of the ophthalmoscope for purposes of diagnosis, it can never be altered. But it is otherwise in respect to a majority of cases. Almost all the examples of the common forms of eye-disease come under the care, in the first instance, and often throughout, of those who are not specialists, and have, perhaps, never even had any training in an ophthalmic hospital. In reference to practitioners so placed, this idea of a new duty was suggested to the Society.

The treatment of syphilitic iritis, for example, is a matter of almost complete agreement among specialists, and their experience is widely known and accepted; yet many eyes are lost every year for want of prompt application of this knowledge. Again, there are in the homes, the schools, the workhouses, and the hospitals of England, some thousands of children suffering from ulcerations of the cornea, attended with intolerance of light, causing the patient great distress through many months, and destined often to leave disfiguring and incapacitating scars; three-fourths of these, probably, would be almost well in the course of a fortnight under the use of a very weak, yellow oxide of mercury-ointment. If this Society could determine upon the recommendation of explicit formulæ for use in such cases it would confer an immense boon upon the public. Such formulæ, so recommended, would be copied into every medical journal, and into every manual. They would be reprinted over and over again, and would become the property of the whole profession. The fact that it is meritorious in individuals to abstain from pushing their favourite remedies, only throws the duty here alluded to the more definitely upon public bodies like ourselves. No one could impugn our motives, or doubt our sincerity, and our verdicts would be received not certainly as final, but as entitled, at any rate, to a temporary acceptance. There can be little doubt that nine out of ten of the practising part of the profession would most thankfully receive from this Society detailed *schemata* for the treatment of

various typical forms of eye-disease, such as purulent ophthalmia, rheumatic iritis, episcleritis, catarrhal ophthalmia, glaucoma. With regard to glaucoma especially a wider diffusion of knowledge concerning the nature of the disease and the necessity for early operation is still greatly to be desired.

Homonymous Hemianopia.—Mr. Nettleship read notes of a case of blindness of one eye with hemianopia of the other, due to the pressure of a tumour on the optic nerve, chiasma and tract on the same side as the blind eye. The man came under care first in 1876, at the age of 30, for recent failure of the left eye. The disc showed slight atrophic changes, and was said by an earlier observer to have been inflamed. Subsequently this eye became nearly blind, the disc atrophied, and the patient lost the right half of the visual field in the other eye, the disc of which also became atrophic. The hemianopia was sharply defined, and the boundary line passed through the fixation-point. The left third nerve also became paralysed. At the same time discharge of bloody mucous from the left nostril, defective smell, difficulty in opening the jaw, and the appearance of a lump behind the jaw on the left side, pointed to a tumour at the base of the skull involving the optic nerve, and at a later stage the tract and third nerve on that side. The man died seven years after he was first seen by Mr. Nettleship, and a large tumour was found, apparently growing from the body of the sphenoid, and compressing, but not infiltrating, the parts mentioned, as well as the crus and pons.

Homonymous Hemianopia.—Dr. Sharkey read notes of a case under his care at St. Thomas's Hospital. The patient, a woman aged 51, had suffered for two years from epileptiform fits, preceded by a visual aura occurring in the right half of the field of vision, and followed by blindness of the same area; also paresis of the right arm, and pain in the head; these three last symptoms became constant. There was no optic neuritis, but there was right lateral homonymous hemianopia, of such a kind that there remained a considerable area of normal central vision on all sides of the fixation-spot. Colour-vision was intact, except in the blind portions. There was no loss of sensation or of speech. When first seen by Dr. Sharkey there was a

painful area on the top of the head posteriorly about two inches in diameter, which was tender on percussion. The diagnosis of a lesion of the left hemisphere affecting the cortical centre for the arm and its neighbourhood was probably as certain as any diagnosis could be, which was not subjected to the test of an autopsy. The succession of phenomena above described presented a vivid and typical picture of cortical lesions.

The case showed that in such lesions central vision may be unaltered. Hence, the cortical area which receives the peripheral fibres of the retina must be to some extent separate from that which receives the central fibres. The probabilities are in favour of the "visual centre" being an extensive expansion of grey matter in the posterior parts of the hemispheres, in which all portions of the retina are represented separately. Probably great varieties occur in the shape of visual defects in homonymous hemianopia due to cortical lesions. The present state of knowledge points to the following conclusions: 1. A lesion of the optic tract produces homonymous hemianopia, and the line of division passes vertically through the fixation-point. 2. A lesion of the cortical centre for the peripheral fibres produces homonymous hemianopia, and central vision is maintained if the cortical area in connection with the latter be intact.

In order to explain the occurrence of cortical hemianopia with retention of central vision Dr. Sharkey suggested a modification of the well-known diagram of Charcot. Let the crossed fibres which meet in the cortex in his diagram represent the central fibres only of each retina; let a neighbouring but distinct cortical centre be added, for the peripheral fibres to corresponding halves of the retinae; from this centre draw a line running down the optic tract of its own side, and let it bifurcate at the chiasma, one portion passing to the periphery of the temporal half of the retina of the same side, and the other to the periphery of the nasal half of the opposite retina. (For another hypothesis see page 332). Then lesion of the optic tract will cause homonymous hemianopia with the line of division passing vertically through the fixation spot; lesion of the cortical centre for the peripheral fibres of the retina will cause homonymous hemianopia with retention of central vision, provided the cortical centre for the latter be intact; at the same

time the predominating connection of each hemisphere will be with the eye of opposite side.

LIVING SPECIMENS.—*Contraction of the Field of Vision and Optic Atrophy affecting only the Right Eye, in a case of Hemiplegia.*—Dr. Ormerod showed a man, aged 44, who had suffered a sudden attack of left hemiplegia fifteen months earlier. He had suffered from syphilis. Atrophy of the right optic disc began about May, 1883. On the outer side of the optic disc, towards the periphery of the retina, was a smooth swelling of a white colour, pushing the retina forward. The field of vision was limited to the lower and inner quadrants.

Mr. Nettleship observed that it was most important to arrive at a diagnosis with regard to the intraocular tumour. He thought that the probabilities were in favour of its being a sarcoma of the choroid in an early stage.

Mr. J. E. Adams said that the case very closely resembled two cases of sarcoma which he had seen at a very early stage.

It was agreed to refer the case to a Committee.

Sequel to a Case of Tumour at the Sclero-corneal Junction.—Mr. Frederick Mason showed a patient who had been the subject of a communication to the Society on December 8th, 1881 (*vide* O. R., vol. i., p. 225.) The growth had not recurred.

Chronic Tuberculosis.—Mr. W. H. Jessop showed a girl, aged 12, with a strong family history of phthisis, and herself suffering from phthisis of both pulmonary apices. In the left eye, at the yellow spot region, was a rounded swelling, projecting one millimetre, of a brilliant white colour when seen with the ophthalmoscope, and ill-defined towards the periphery; between the disc and the swelling were eight small brilliant white spots. He considered the larger swelling to be most probably tubercular.

Glaucoma.—Mr. Pigeon showed with Dr. Brailey a boy aged 14, in whom glaucoma had succeeded a blow on the eye with a cork. The lens was not dislocated, but, three weeks after the blow it had begun to show opacities. Tension had diminished and vision had improved under the use of eserine.

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vollständige Heilung; 5. Ein Fall acuter einseitiger
Neuritis optici; 6. Beiderseits Neuritis nach Erysipelas
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ON EXOPHTHALMIC GOITRE.

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(Concluded from page 325.)

Powerful confirmation is afforded to any theory of disease when the clinical symptoms appear to accord with the supposed pathological changes. The theory which explains the three principal symptoms in Graves's disease—the palpitation, the proptosis, and the goitre,—by disorder or disease of separate centres, is confirmed by the fact, among others, of the marked want of relation to each other which these three classes of symptoms often present. The small number of my own cases of course affords no information as to the frequency with which the usual relation is disturbed, but they are sufficient to offer ample proof of the occurrence of such disturbance.

Thus, of twenty-three cases of Graves's disease, goitre was certainly absent, or of questionable existence in six ; of these six cases palpitation was extreme in four, and proptosis existed in a great degree in one, was absent in one, and was moderate in degree in the others. Again, I have noted that proptosis was either absent, or its presence was not certain, in four cases out of the twenty-three ; in one of these four cases goitre was also absent, in three it was of large size, in three of the four cases palpitation was severe, in one it was of moderate character. In one of the cases, in which there was no evidence of proptosis, lacrymation was present. In three other cases the eye symptoms appear from the report to have been chiefly if not entirely limited to

Stellwag's sign, an abnormal widening of the palpebral aperture; in two of these the heart symptoms were severe, in one the goitre was large.

The heart symptoms, specially constituted by deranged action, were present in various degrees in all the twenty-three cases. I may add that in one case, in which there was severe palpitation with large goitre, but no proptosis, the patient was under observation for seven years.

I may also refer to the differences in the order with which the symptoms make their appearance, in further illustration of the same subject. These differences are most clearly observable in proptosis and goitre: the position of the cardiac symptoms has only been ascertained in a few instances; and, indeed, in cases in which this symptom exists in moderation only, the account given by the patient is open to fallacy. With this caution I may report four cases in which cardiac disturbance is not the earliest symptom reported by the patient; one patient described it as coming on twelve months after the proptosis (goitre was absent), another two years after proptosis had appeared, its occurrence coinciding with the goitre.

As regards goitre and proptosis, there are three instances in which the goitre preceded the proptosis, according to the patients' account; in one of the three it preceded "by some time." There are three cases in which the proptosis is represented as anticipating the goitre, in one patient by one, in one by two years. There are two cases in which proptosis and goitre were believed to have been coincident in their occurrence.

I now proceed to narrate the particulars of a case which is still under my observation, in which the variations from the usual relation to which I am adverting is carried to its extreme limit. The case is one in which both exophthalmia and goitre are practically absent, yet the cardiac symptoms exhibit the utmost degree of severity. In the early period of the patient's

history there appears to have been some "fulness of the throat"; but during the important part of the illness goitre was certainly not present; and the only sign of an unnatural condition of the eyes was the (apparently) permanent contraction of the pupil, uninfluenced by the withdrawal of light. There were also present other of those nervous and nutritive derangements of which I have spoken in a former part of this paper.

The case appears to me to possess much interest from the character of the cardiac disturbance itself, which, I think, bears valuable testimony in favour of the central theory, so far, at least, as that theory involves withdrawal of the inhibitory control exercised by the vagus. I may point in passing to the vomiting, which was present in the early part of the case, as directing attention to the vagus, the nerve largely concerned in the production of that symptom; the severe angina pain also implies a nervous origin. But it is the character of the heart's action to which I specially draw attention in the present connection. I have never been able to accept the accelerator theory as satisfying the conditions of the problem which it is cited to explain. Nor does the hypothesis which refers the rapid and irregular cardiac pulsations to lowered arterial tension appear to be justified by clinical phenomena (except, indeed, in cases in which the lowered tension is a sudden occurrence, and of temporary duration). It must be in the experience of most physicians that cases of severe nervous disorder, often assuming the character of hypochondriasis, occur in patients in whose radial artery the tension has been so much reduced as even to simulate the pulse of aortic insufficiency. It was, I presume, to such cases that Dr. Broadbent alluded in his lectures on the Pulse some years ago, when remarking on the obstinate nature of cases in which arterial tension was lowered. Yet in these cases the action of the heart bears no resemblance to that observed in my patient, and, I think, in the majority of cases of Graves's disease.

Greater rapidity of heart's action attained through exaltation of stimulus would be expected to retain regularity of rhythm, at least until extreme fatigue was induced ; but in my patient the cardiac phenomena were of a very different description, and were precisely those which theory would lead us to expect when the regulating and controlling function was in abeyance. The extreme rapidity of the beat, the variations of the rhythm in this same patient within a minute of time, the hasty delivery of a series of rapid pulsations, followed by a momentary lessened frequency as if from exhaustion, and then by renewed rapidity, and the extreme indistinctness of the radial pulse, all bear the same significance. I would also direct attention to the repeated testimony of the patient as to the extreme sensitiveness of the heart to very slight degrees of excitement, as exhibiting precisely the condition of an organ deprived of the influence which in health restrains action within needful limits, and enables the organ to offer resistance to accidental excitement.

There must also be added the evidence of vaso-motor paralysis afforded by the throbbing of the carotids and by the peculiar condition of the vessels of the hands and fingers, the liability to perspiration, and not improbably by the profuse watery non-fœcal diarrhœa.

The remarkable and sudden changes to which the subjects of the disease in question are liable are also illustrated by this patient. The anasarca which at one time formed so prominent a feature in the case that the lower limbs lost their natural shape, appears to have been largely due to nervous influence, since it disappeared at the time when the urine was reduced to its smallest quantity, whilst the power of the heart remained very infirm.*

* I am of course alive to the possibility of referring the symptoms to disease of the trunk of the vagus, but the other symptoms in this case negative such an explanation.

CASE 5. A lady, aged 47, of nervous temperament, daughter of a "frightfully nervous" mother, now suffering from tremor, and with three very nervous sisters, had been under my care occasionally for unimportant ailments, chiefly of a nervous character. She came to me in September of 1880 complaining of pain in the anterior region of the chest, passing down the front of the arms; the pain was especially excited by exertion, and often caused vomiting; vomiting also occurred independently of the pain. The attacks of vomiting speedily ceased, but the pain continued, and on her returning six weeks afterwards I found the pulse beating at the rate of 140 in the minute, the rate subsiding to 124 after the patient had sat for some time. She complained much of palpitation, which, she said, was so easily excited that it was only necessary to speak to her in order to bring it on; so irritable was the heart that if she took only a tumbler of cold water its action became quickened.

The pain occurred only when the palpitation had reached a certain degree, and then the chest "seemed full of pain."

The only circumstances which could be looked to as accounting for the disease were that the patient had lived for a considerable length of time in a very damp house, the moisture even sometimes trickling down the walls of the room, and that she had been subject to worry.

In my early notes there is some uncertainty with respect to the state of the thyroid. At one of her first visits "fulness" of the thyroid was noted, and this fulness was again referred to; but during the chief part of the history, down to the present time, the absence of anything of the character of goitre has been complete. The eyes have been perfectly natural, excepting that the pupils are reported on four different occasions to be contracted, and not to dilate when withdrawn from the light. For this reason I was unable to make an ophthalmoscopic examination, as I did not wish to subject the patient to the inconvenience to which the use of atropine would give rise.

The patient was also troubled with painful sitting, occasioned by a tender coccyx, referred to her last confinement five years previously.

At the end of the year the pulse varied between 110 and 134. The cardiac pain continued severe, shooting from the

region of the heart to the left shoulder and passing down the front of the left arm. It awoke her at night, and obliged her to sit up half a dozen times in the course of a single night. After sitting, she was compelled to exercise great caution in lying down lest she should renew the pain. Her carotids throbbed much. There was a jugular bruit, but none in the heart nor in the arteries. The patient was free from any evidence of anæmia. At this time she had some of the diarrhœa, which subsequently assumed so prominent a place among the symptoms; she passed five or six stools in the day.

Nearly a year and a half elapsed before I saw her again, in May of last year. Her essential symptoms remained the same; pulse 128 to 140. I found a loud whizz in the carotids, but no bruit in the heart; the first sound was very loud and sharp. She now spoke of a sense of heat over the surface, so often experienced by sufferers from Graves's disease; and she had an uneasy sense of suffocation when she lay down, or when the thyroid was touched; the thyroid was of natural size.

The ensuing seven months witnessed one of those remarkable changes in nutrition which sometimes occur in these patients; the change was no doubt hastened by increase of diarrhœa. The patient had lost the pain in the cardiac region and walked with much ease, but she was suffering from incessant diarrhœa and much thirst. The character of the evacuations she described as being of white fluid without any fecal odour. She had shrunk to a marvellous degree; she had fallen from a condition of embonpoint to one of actual emaciation. Her carotids throbbed; the radial pulse could not be counted; the action of the heart was very tumultuous; the apex beat half an inch to the left of the nipple line. There had been some œdema of the legs during the summer. She was very prone to perspiration, the least elevation of outside temperature gave rise to considerable sweating. Her urine was of deep colour, free from albumen and sugar, and did not deposit phosphates on boiling.

Five months elapsed before her next visit (she lived at some distance from Birmingham), in May of the present year. She had been to Torquay in the interval. There she lost the diarrhœa and regained some flesh, but the diarrhœa returned to a less amount on her return. I was obliged to use the

stethoscope to ascertain the frequency of the cardiac pulsations ; they numbered at least 200. The rhythm consisted of a series of rapid beats, followed by a pause, after which the series recommenced, at first with some deliberation, but quickly gaining a great degree of rapidity. The first cardiac sound was obscure, the second was clear. The arteries of the neck were mobile. There was a little œdema of the legs and of the abdominal walls. A tendency to tremor was also perceptible. She had lost the perspiration, but she "burnt in bed," and was obliged to throw off the clothes.

The discharge of urine now lessened, and the anasarca increased. The rhythm of the heart consisted of six to twelve beats given with great rapidity, followed by three or four deliberate pulsations, and then a renewal of the series. If she allowed her hands to hang down the blood settled in the hands and fingers, and she was obliged to hold them up in order to induce the blood to fall back. Diarrhœa was profuse ; the abdomen was becoming distended with flatus.

Her condition became so alarming that she determined to come to Birmingham and place herself under the care of Mr. Bartleet.

Emaciation was advanced ; anasarca was increasing, and became so excessive that when she placed her feet on the floor the knees were completely obliterated ; the abdomen was extremely distended, but was free from fluid.

By strict confinement to bed, under the charge of a skilled nurse, she began to improve, and during the next three months amendment made considerable progress. The heart's rhythm was more regular, but there were about twenty pulsations at the wrist fewer than at the heart ; the urine kept persistently below the normal quantity. The diarrhœa entirely ceased by degrees, but the anasarca remained considerable. She returned home at the end of August, and I saw nothing more of her until a few days ago.

Another change had then taken place. She most positively affirmed that for a week she had not passed above a teacupful, and for twenty-four hours "not a spot" of urine. Bitartrate of Potass, prescribed by Mr. Bartleet, effected some increase, but soon lost its power. A specimen of urine boiled at her visit was high coloured, sp. gr. 1.025, and contained a trace of albumen.

To my surprise the anasarca had quite disappeared. The abdomen was greatly distended with flatus, and now contained some fluid. The heart's action was much as when she left, a frequent ineffective beat interposing.

I fear it must be admitted that in this, as in so many other instances, our pathology has at present outstript our therapeutics. Indeed it must be at once evident that no general expression of the kind of treatment required can be formulated until we know the nature of the lesion which causes the symptoms, as well as its locality. Doubtless the lesion is different in different cases: the diversity observable in the course pursued by the malady in various patients proves this to be the case. A remark by Michael Foster (p. 148, 2nd ed.) indicates one method by which variety may be introduced into the nature of the lesion. "Hence the cardio-inhibitory centre might itself be inhibited by impulses reaching it from various quarters. In other words, the beat of the heart might be quickened by a lessening of the normal action of its inhibitory centre in the medulla. It is in fact probable that many cases of quickening of a heart's beat are produced in this way, though the matter requires further investigation." The near relation which our subject bears to the opinion expressed in this quotation, is illustrated by the statement of Mr. Alfred Freer in my second case, as to the beneficial result of lancing the gums covering a very large tooth in two cases of the disease.

Dr. Handfield Jones speaks strongly in favour of tonics, and my best success has been gained by means of iron strychnine and cod-liver oil. But in the two cases to which I particularly refer, the tonic treatment evidently derived powerful assistance from quietude rigidly enforced, and from careful nursing. That this is a necessary condition of success is at once manifest on the face of the symptoms; and the theory discussed by Dr. Fitzgerald obviously adds force to the belief in its necessity, since an organ liberated from

normal control, like an ill-regulated mind, is especially exposed to provocation even of a slight character. It cannot be too much to say that without this element every kind of treatment must fail; though the converse is by no means equally true. The lady whose case I have just narrated took iron for twelve months; yet the disease advanced, nor was its progress arrested until she was taken in charge by a skilled nurse and kept in bed.

In another case *digitalis* was the only remedy which succeeded in controlling the excessive action of the heart, without, however, influencing the other symptom; yet this medicine has failed with me in several instances. Tincture of belladonna carried to the extent of 50 minims three times a day, combined with rest in bed, entirely failed in one patient. Once I believed that galvanising the sympathetic nerve by the continuous current, according to the method recommended by authors, reduced the proptosis, but its benefit extended no farther. I was prevented by circumstances from repeating the trial in two other cases.

Iodide of potassium, arsenic, cod-liver oil, and hypophosphite of soda tried in one case entirely failed.

The tonic treatment already indicated, combined with thorough quiet and avoidance of all disturbing influences, is, I believe, the method of treatment most generally applicable, though of course other remedies will be required according to the peculiarity of the individual case.

ERYTHROPSIA IN APHAKIA.

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The occurrence of red vision after cataract operations, though rare, is a phenomenon of such a peculiar nature, and withal so alarming to the sufferer, that it is of importance that its nature and causes should be more satisfactorily ascertained than has hitherto been done. For this purpose it is advisable that each observer should

record fully and faithfully the cases which may happen to occur in his practice, so that in time a sufficient number of fully noted cases may be on record to enable an analysis to be made, and firm conclusions deduced. The following case presents some peculiarities which may help to throw light upon the true nature of the affection.

T. H., aged 28, consulted me at St. Mark's Ophthalmic Hospital on June 12th, 1882. He stated that whilst taking up a carpet that morning, a tin tack flew up and struck his left eye. Examination showed a small, nearly central, wound in the cornea, the anterior chamber was evacuated, the iris uninjured, and the lens opaque. After subsidence of the inflammation discission was performed, and subsequently the lens substance was evacuated through a linear incision in the cornea. The patient left the Hospital on August 7th, 1882, in the following condition:—The cornea showed a very trivial linear opacity; the anterior chamber was normal; the iris was active, with a central, freely movable, round pupil. There were some shreds of opaque capsule visible at the lower border of the pupil; but the pupillary area was clear. L. c + 12 D.V. = $\frac{6}{6}$, c + 16 D. V. = Jä 1 at 25 cm.; R. V. = $\frac{4}{60}$, Jä 16 badly at 10 cm. The right eye was amblyopic, as it had always been affected with myopic astigmatism, and all his work had been done with the left eye.

On leaving the hospital he was ordered smoked glasses, which he wore for six weeks, after which he was allowed to wear the glasses as above. For the following six months he wore the glasses, and read and wrote with the greatest ease, and without experiencing any unpleasant sensations until March 26th, 1883. He had been out walking nearly the whole of that day, wearing his glasses. About five o'clock in the afternoon, whilst still in the open air, he removed his glasses, when suddenly, and for the first time, he observed everything, and especially the sky, to be of a "blood-red" colour. The day had been very bright and sunny, and the ground was white with snow, the glare from which made his eyes feel very tired. Moreover, he had worn his glasses the whole of that day, a thing he was not in the habit of doing for more than three or

four hours at a time. This phenomenon lasted without intermission or remission for four days and nights, being experienced alike in artificial and day light, and with or without his glasses. After the fourth day it disappeared totally for some time, and the colour was never so deep since. I examined the eye on several occasions in the erect image by gas-light, but failed to discover any abnormal appearance in the fundus, nor was there any undue vascularity or external irritation. The vision remained as before the attack.

For the following three months he had very frequent recurrences of the redness, which he likened to "a deep sunset." Gradually the intensity of the colour, as well as the frequency of the attacks, diminished, and it is now (November 13, 1883) many weeks since he has observed the phenomenon ; but he feels that if he exposed himself to the influences which experience showed him excited the attacks, he would again suffer from the red vision. The exciting and aggravating causes were :—(1.) Long use of the glasses (the erythropsia did not usually show itself while he was wearing the glasses, but immediately on taking them off). (2.) Long exposure to bright light (the phenomenon occurred not while he remained in the bright light, but on going from it into a dull light or into artificial light). (3.) Reading much, especially by gas light. (4.) Having a cold in his head (any of the other causes operated more rapidly and with greater intensity at such times). (5.) The erythropsia was always more likely to occur in the evening.

In a letter which he wrote to me some months after the first onset of the erythropsia, giving an account of his sensations, he says :—"Since the first attack it (the red vision) has not been so bad, generally resembling a deep sunset, but it depends, in a great measure, on whether the day is sunny or cloudy. I can wear the glasses for two hours on a day that is cloudy without producing as much effect as half-an-hour of strong sunshine will cause.

"If after wearing the glasses for a short time in the sun I remove them, I will then notice the redness ; but if I put them on again after a period of say ten or fifteen minutes the redness then becomes visible through the glasses. Wearing my glasses for about two hours under the sun leaves the red

shade visible for the remainder of the day. It becomes more marked after the gas is lit, and is often visible the next morning for about half-an-hour after I get out of bed. Wearing the glasses for two or three hours (in the open air) on a dull day will also produce redness, which will only be visible for that evening, and not appear next morning.

"Sometimes the redness appears in the morning without having worn the walking glasses the previous day. One morning I only wore the glasses for half-an-hour, from 9.30 to 10 o'clock, and the redness, though not visible that day, appeared the next morning, and remained bad until 12 o'clock noon, and was just noticeable for the remainder of the day. Reading by gas light may bring it on, so much so that I often have to leave the book by; but it is not noticeable next morning. Reading by daylight brings it on slightly for a short time."

When the erythropsia had lasted over two months I ordered him a pair of smoked glasses of same refractive power as his walking glasses. After that he writes: "There is a marked improvement, but I don't think it is altogether due to the dark glasses, as I generally wear the original ones, and they seldom bring on the redness, and I noticed it after wearing the dark glasses when I got them first."

About five months after the first onset of the erythropsia an interval of some weeks occurred in which he saw no abnormal red; after this he noted an attack in which he observed that when looking at anything only the upper segment of it was red, the lower half appeared of its normal colour. He compared it to a red "fog," or "haze," covering the upper portion of everything he looked at; it seemed to be "on a level with his eyes."

This condition of horizontal hemierythropsia showed itself at intervals for a month. Since then the red-vision has not been present in any form. No intermediate stages had been observed by him—*i.e.*, at no time had he seen $\frac{2}{3}$ or $\frac{1}{3}$ of the field red and the remainder normal.

The red colour of the field in the attacks of hemierythropsia was not so deep as that in the attacks of total erythropsia.

For a month or so before the onset of the erythropsia he noticed that frequently, when looking at print, a small light-

grey, incomplete scotoma, through which he could see, partially covered, the word he was at the moment fixing. Since the erythropsia has disappeared he finds that when reading at first the print looks quite natural, but after a short time it seems to grow pale, and the contrast between it and the white paper diminishes to such an extent that he finds difficulty in continuing to read; the paper and print both get grey. Rest again will restore the normal brilliancy to the letters.

At no period of the affection had the erythropsia showed itself in the unoperated eye. Shutting of the aphakial eye always caused the red to disappear; it was therefore not in any way of the nature of "after images."

Purtscher (*vide* O. R., vol. ii., p. 278) has collected the notes of eight cases of erythropsia from different sources, and from a consideration of their leading features has deduced several important conclusions which I need not repeat. He, however, takes for granted some points without, as I think, sufficient grounds.

He unreservedly adopts Hirschler's hypothesis attributing the erythropsia to fatigue of the retina, and speaks of "torpor for certain colours" as underlying erythropsia.

In all the cases recorded by him, as well as in my case, the *visual acuity was not less* during the attack than it was before or after. If torpor for certain colours were the true cause, one would expect to find the visual acuity diminished in proportion to the illumination lost; and as compound white under equal illumination is visible at a greater distance than any of its components, were the red-vision due to torpor for other colours the acuity should be proportionately diminished. Again, the *intensity of the colour*, "as red as blood," is against the fatigue theory, for it is hardly to be conceived that the retina would be so totally insensible to the other colours of the spectrum whilst having a sensibility so intense for red. Moreover, in some of the cases

recorded the phenomenon was most marked in the house, in others most in the open air.

In one case, Hirschler's (*Wiener, Med. Wochensch.*, 1883, No. 4-6), partly closing the lids so as to limit the amount of light, made the redness fade and disappear. In another case, Purtscher's (*Centralblatt f. prakt. Augenheilkunde*, June, 1883), the use of a stenopæic apparatus produced a similar result.

Are these facts compatible with the fatigue theory? In snow blindness, electric light blindness, etc., where fatigue, or at least overstimulation, would seem to be the obvious cause, red-vision is not the condition produced. Nor, again, in aphakial erythropsia is conjunctivitis, which is the peculiar feature of electric light and snow blindness, ever observed.

But perhaps the strongest argument against the fatigue theory is the *mode of disappearance* in my case. Hemierthropsia, of such a definite kind as the patient (who is a most intelligent observer of his own symptoms) has described, is a condition requiring explanation of a different kind, and which it is by no means easy to offer.

It may be well at this point of the argument to consider what are the grounds for another assertion which Purtscher makes. He states that "the phenomenon of erythropsia in aphakia is a purely subjective sensation." In all probability this is true as far as the retina is concerned, but he does not seem to have made the necessary examination to determine this; at least if he has, he has modestly concealed the fact. It is not enough to examine the eye by gas-light in the ordinary way; slight changes, and especially such colour changes as might conceivably be present without interfering with visual acuity could, with more certainty, be observed by a day-light ophthalmoscopic examination than by the yellow light of a lamp.

I regret very much that, being absent from town during the time that my patient was suffering from the hemierthropsia, I lost a most favourable opportunity of

settling the point ; for there, by a day-light examination of the normal and the erythroptic portions of the same retina, the slightest changes in colour, etc., could have been observed.*

A peculiar feature of erythroptia is its marked predilection for aphakial eyes. Purtscher's suggestion that the coloboma of the iris and the diminished refraction subject the peripheral portions of the retina to stronger illumination than the normal, and thus conduce to fatigue, is untenable as an explanation, because in two of the recorded cases (Dimmer's and mine) the iris was intact and the pupil movable. And, again, the erythroptia does not affect the periphery only of the field, but every part of it ; and, again, wearing the glasses (and thus rendering its refraction emmetropic) had a distinct effect in determining the attacks.

Nor can I think that any importance should be attached to the long screening of the retina from light by the cataract, producing an increased liability to fatigue. In my case the cataract, being recent, could have had no such action.

Purtscher further thinks that red-vision would be heard of more frequently but for the careful protection of the eyes after cataract extraction ; but a glance at the cases he quotes will show that the erythroptia may come on at any period from a month to two years after the extraction, and in a large majority of the cases several months' interval occurred, during which the eye was freely exposed to the light.

Slight degrees of erythroptia fugax are by no means uncommon. Not many months ago, walking down to hospital one morning, the sun was very bright, when I went into the Board Room, and on looking out of the window at a whitewashed wall it seemed to me to be of a decidedly pink colour. This appearance faded in a few seconds.

* For this suggestion I am indebted to my colleague Dr. Story.

Mr. Story has informed me that after looking at an albo-carbon flame the other day words printed in black ink appeared red. The whole page was not red, but only a word here and there. The deception was so perfect that he asked a bystander why unimportant words were emphasised in this way. He has tried since in vain to reproduce the phenomenon. Such cases, however, seem essentially different from true erythropsia.

We know but little, if anything, of the intimate nature of colour-perception, and until we do it is idle to do more than suggest possible explanations according to our theories. It is quite possible that the affection may be essentially a nervous one, the retina being the peripheral nerve-ending, irritation of which induces the attack. From an analysis of the leading symptoms of the cases reported it seems more proper to regard the phenomenon as one of over-sensitiveness for red than of torpor for all other colours—more a hyperæsthesia than an anæsthesia. And, agreeing with this view, we find the attacks induced by such causes as nasal catarrh, overheatedness, violent exercise, laughing, dancing, mental excitement, etc., causes which, though quoted by Purtscher as favouring nerve-exhaustion, may with equal, if not greater probability, be supposed to conduce to nerve-irritability, and thus favour the theory of hyperæsthesia. Colour-blindness may be the anæsthetic counterpart of hyperæsthetic erythropsia.

It is much to be regretted that the spectroscope was not employed in testing this and the other cases. By this means the question as to whether Erythropsia was essentially a hyperæsthetic or an anæsthetic affection could best be settled.

TH. LEBER (Göttingen). Keratomycosis *Aspergillina*
Von Graefe's Archiv., XXV., II., p. 285.

BAUMGARTEN (Königsberg). Keratomycosis (?). *Von*
Graefe's Archiv., XXIX., III., p. 117.

W. UHTHOFF (Berlin). Partial Necrosis of the
 Cornea from Invasion of Fungi (Schimmelpilzen).
Von Graefe's Archiv., XXIX., III., p. 178.

Leber's paper published in 1879 contains the first case of this form of corneal inflammation to be met with in ophthalmic literature. The patient had received an injury from a grain of oats, which resulted in severe ulceration of the cornea and hypopyon. Treatment, including Saemisch's incision, proved unsuccessful, and the ulcer became covered with a light grey membrane, which on microscopical examination was found to be composed of densely packed masses of some fungoid growth. The fungus was proved to be *Aspergillus glaucus* by numerous carefully-conducted cultivation experiments. Leber subsequently experimented upon rabbits, and ascertained that this fungus can grow rapidly in the living cornea, producing a severe form of purulent keratitis.

Baumgarten describes the appearances found in an eyeball which Prof. Julius Jacobson had enucleated for commencing sympathetic ophthalmitis. A blow had been received from a hay-fork about nine months previously, and at the time of operation the globe was smaller than its fellow, the cornea was of a grey-green colour except in a zone about 2 mm. broad at its periphery, the anterior chamber was half full of blood, and there was no visible cicatrix. On opening the globe a small depressed cicatrix was found in the sclerotic about 4 or 5 mm. behind the lower margin of the cornea, the pupil was closed by a tough greyish membrane, the retina completely detached, the lens dislocated, and bound down by a firm mass of greyish colour in connection with the depressed cicatrix mentioned above. Between the retina and chorioidea lay a half-transparent brownish mass, whose colour as it neared the chorioid became first yellow and then rusty brown. The colour of the cornea was found to depend upon the presence of what Baumgarten regards as an organism of a low type, and not upon the presence of altered blood components as he at first anticipated. All the normal

histological components of the cornea were present without any noticeable alteration in their characters, but the cornea proper was infiltrated with numerous densely-packed strongly-refracting, colourless, rod-shaped bodies, with sharply-defined outlines and of various sizes, the largest 0.0048 mm. long and about $\frac{1}{4}$ as broad. These bodies were unaffected by acids or alkalis, and remained unaltered by chloroform or by boiling in absolute alcohol and ether. They were not coloured by the reagents which ordinarily stain nuclei, and which in this case acted normally upon the corneal cells. They became brown when treated with iodine and concentrated sulphuric acid. No pus cells were present, nor were solutions of continuity found in any of the corneal structures; Bowman's and Descemet's membranes, and the anterior epithelium, and the endothelium were perfect.

The infiltration was most dense in the centre, and gradually disappeared towards the periphery of the cornea. None of the bodies described were found inside any corneal corpuscles, nor inside any epithelial cells—they always occupied the inter-cellular spaces. None were found in the anterior chamber, or in the subretinal exudation, nor anywhere else except in the cornea. All cultivation experiments undertaken with the organisms were unsuccessful, perhaps, as Baumgarten conjectures, owing to his ignorance of the normal conditions under which they flourish, or more probably owing, he supposes, to their being already devitalised at the time the globe was enucleated.

Baumgarten then experimented upon living rabbits by injecting fluids containing finely-divided zinnobar, and aniline blue in suspension into the conjunctiva, the sclera, the vitreous, and the anterior chamber, and in no case did any particles find their way into the cornea. Similar injections of fungus spores were also unsuccessful so far as penetrating into the cornea was concerned.

Several hypotheses may be advanced to explain the presence of micro-organisms in the cornea in the case described in this paper. It is known from the experiments of Eberth, Leber, and others, that certain organisms (micrococci, *Leptothrix buccalis*) can enter the corneal tissue through a very slight superficial abrasion, and this may have occurred in

Baumgarten's case, the abrasion subsequently healing with a cicatrix too minute for observation. The second hypothesis is based upon Baumgarten's own observations. He found that the bacillus of tubercle, and also the spores of *Aspergillus fumigatus* were able to make their way into the cornea through the membrane of Descemet and proliferate in the corneal tissue. (*Aspergillus glaucus*, according to Baumgarten, cannot propagate in the cornea, nor in any other tissue of the living animal body, behaving in this respect similarly to *Penicillium glaucum*, and *Mucor mucedo*). It is true that no organisms were found in the anterior chamber, but Baumgarten supposes that they may have been destroyed by the inflammation which had undoubtedly taken place there, while those in the cornea may have survived in consequence of that tissue having remained free from any inflammatory process.

The hypothesis that what was found was not an organic body, but the chemical product of some pathological process in the cornea itself cannot be altogether excluded. Leber has examined the specimen, and states that he has never seen any similar bodies in the cornea, but that the case differs from all the examples of keratomycosis he has examined in the corneal tissue itself remaining, so far as could be ascertained, perfectly unaltered.

Koch, however, who has also seen the specimens, considers that the bodies are not organised, though they strongly simulate bacilli, because they lack the peculiar reflex (*glanz*) of bacilli, as well as some of their staining properties, and also because they differ so much in size. He thinks it probable that they are the crystalloid remnants of some previous exudation. If this be so, Baumgarten has described a hitherto unknown crystalloid product of the living animal body, and the interest of the case can hardly be regarded as less than it would be if Baumgarten's own theory were accepted.

The microscopical specimens obtained in Uhthoff's case were shown at the Ophthalmic Section of the *Naturforscher Versammlung*, in Eisenach, in 1882 (*vide* O. R., vol. I., p. 411). The patient received an injury to his cornea from the fall of a pear during the fruit harvest of 1881, which resulted in severe hypopyon keratitis. No ulceration was present, but a portion of the cornea a little above its centre was of a yellowish-grey

colour, and considerably raised above the level of the rest of the cornea. This portion became gradually of a more intense yellow colour, and of a peculiar dry appearance, at the same time increasing in superficial area. It finally exfoliated from the underlying tissue, leaving a large ulcer which healed in a relatively short time. The resulting leucoma completely covered the pupillary area, but after iridectomy vision was restored to the amount of $\frac{1.5}{200}$.

Microscopical examination discovered dense masses of the mycelium of some fungus in the necrosed tissue, the most superficial portion being chiefly affected, while the deeper layers were completely free from any such infiltration, and only exhibited the signs of antecedent inflammation. Unfortunately no cultivation experiments were attempted, so that this case remains open to some of the objections which are alleged against Baumgarten's case.

OTTO BECKER (Heidelberg). *Anatomy of the Healthy and Morbid Lens.*

(Concluded from page 341.)

Chapter VI. Diseases of the Lens systematically arranged.—

In this chapter the various abnormalities of the lens are considered in succession, with reference to their causes, so far as these are at present known. They are divided into three chief groups, viz.:—(1) Malformations; (2) Pathological changes in the normally grown lens not due to external injury of the eye; (3) Pathological changes due to external injury of the eye.

1. *Malformations of the Lens* are commonly classed as congenital, and acquired, according to whether they are present at birth or arise subsequently, but such a division has no etiological foundation. Some congenital abnormalities must be referred to the period of development proper, others to the period of intrauterine growth (*vide* O. R., vol. ii., p. 237).

a. *Malformations not associated with other Morbid Changes in the Eye.*

Central Lental Cataract.—Of this variety no complete microscopical examination has yet been made. The opacity corresponds in situation with the oldest of the embryonic lens-fibres.

It is surrounded by layers of normal fibres, and is referable to the second period of development,—about the sixth or seventh week in the human embryo.

Fusiform or Spindle-shaped Cataract.—This form of opacity occurs by itself, and it occurs together with other abnormalities of the lens. It consists in an axial opacity, extending from pole to pole, and may be combined with both a central and a lamellar opacity. At one pole, or at both, the opacity may be expanded, and the capsule depressed. A hereditary tendency to malformation of the lens has been observed in such cases. It is probable that the opacity is formed early in the development of the lens, and that as the fibre-layers are subsequently laid down, it remains intimately connected at each extremity with the capsule; as the poles separate it becomes more and more stretched out, and forms a permanent obstacle to the complete union of the fibres in the axial line.

Posterior Polar Cataract (true) consists of coagulated albuminous fluid within the capsule; it has been met with congenitally, together with fusiform cataract, and in such a case must be referred to some disturbance in the third period of development.

Zonular Cataract must in some cases at least be referred to a disturbance during development, for it is found in combination with central and with fusiform cataract. The disturbance of nutrition, whether it be due to a mechanical shock of the lens, or to a constitutional disorder such as rickets, damages the fibres which at the time of its occurrence form the peripheral layers of the lens, and leaves them permanently deficient in transparency. The damage does not amount to a destruction of the fibres, for if this occurred, a continued nutrition of the transparent nucleus would be impossible; on the other hand, it is often sufficient to lead on to a further degeneration later in life. Radiating opacities are added by degrees to the original. Zonular opacity, and sometimes total degeneration, follow in the same way as in senile cataract. The completely concentric form of the opaque zone proves that the disturbance arises not earlier than the beginning of intra-uterine growth—*i.e.*, after development is completed. An intra-uterine origin is not impossible even in those cases in which

the opacity is said to have made its first appearance after birth, for it may be supposed that the damage is originally very slight, and that the pronounced loss of transparency sets in later. On the other hand, there is theoretically no reason to deny that similar nutritive disturbances may lead to the formation of zonular opacity during the extrauterine growth of the lens.

Indented (gekerbt) Lens.—In both lenses removed from a syphilitic infant one week old the author found a peculiar horse-shoe-shaped indentation nearly 1 mm. deep, in the posterior surface.

Conical Lens.—Two cases are on record in which the anterior surface of the lens projected forwards into the anterior chamber, forming a regular shaped cone of perfect transparency. The patients were men aged 23 and 24. In the one case it appears possible that the abnormality was congenital; in the other, it developed gradually during a period of eight years.

B. *Malformations associated with other Morbid Changes in the Eye.*—In many cases of congenital abnormality it is impossible to decide whether a fault in the development of the lens has influenced the formation of the eye, or whether the mal-development of the eye has arrested the formation of the lens. In imperfect closure of the foetal fissure the blood-vessels which enter at this point into the interior of the eye are largely concerned, and accordingly many cases of congenital cataract are found to be associated with an imperfect retrogression of the hyaloid artery and vascular capsule of the lens.

Anophthalmos and Microphthalmos are of essentially the same nature as coloboma oculi; the cysts so frequently present behind the under eyelid when the globe is imperfectly developed are formed by the gradual enlargement of the cyst-like appendages which are always present in extreme cases of coloboma of the choroid and optic nerve. In many cases of microphthalmos, the lens or its rudiment remains in contact with the retina or optic nerve entrance. In others it is somewhat more advanced, and is embraced by the hyaloid artery behind, and by the pupillary membrane in front, but still lies abnormally deep in the eye. Persistence of the hyaloid artery, and of at least a portion of the vascular capsule of the lens, is the rule in these congenital abnormalities.

Seeing that the hyaloid artery has no companion vein it may be assumed that, so long as its branches carry blood, a venous connection still exists between the vascular capsule and the iris; and as a matter of observation the membranous cataracts with which a persistent hyaloid artery is associated are usually found to be adherent to the iris. An inflammatory process is perhaps the cause of the non-disappearance of these vascular connections.

Unsymmetrical Development of the Zonula may cause a malformation in the lens.—The imperfect closure of the foetal fissure, which is the cause of coloboma of the iris, is usually associated also with a defect in the ciliary body, one or more of the ciliary processes being absent or imperfectly developed, and at the same spot there is commonly an imperfection in the zonula. The lens-margin shows a corresponding indentation characterised by a darker outline of total reflection.

Apart from congenital coloboma, an unequal traction of the zonula in different directions leads occasionally to remarkable abnormalities in the form of the lens.

In congenital *ectopia lentis* the lens is usually somewhat below the normal size, but there is no reason to suppose that the arrangement of its fibres is in any way different from that in the healthy eye. Such lenses are not especially prone to become cataractous, hence it may be assumed that, in spite of the unequal length of the zonula at opposite sides, the nutrition of the lens is normally carried on. The cause of the unsymmetrical development of the zonula is unknown, but, seeing that the displacement is almost always upwards, with or without some lateral deviation, it is probably connected with some disturbance in the closure of the foetal fissure.

2. *Pathological Changes in the Normally grown Lens occurring independently of External Injury*.—The changes belonging to this class are all characterised by a loss of transparency in the lens. They originate either secondarily to other disorders of the eye itself, and in this case appear commonly as unilateral cataract; or in general constitutional disorders affecting both eyes alike, and then appear as cataract in both simultaneously or in one soon after the other.

Unilateral Cataract secondary to other disease in the Eye.—*Anterior Polar Cataract* may be either congenital or acquired.

The congenital form must be referred to some inflammatory disturbance occurring at the end of the second or during the third period of development, for did it occur earlier the lamellar structure of the lens would necessarily be imperfect, which is not found to be the case. In both varieties the mode in which the opacity originates is the same. Observation has proved that a very brief contact between the anterior capsule and an inflamed and ulcerating cornea may lead to subcapsular cell-proliferation; also that suppuration in the anterior chamber damages only that portion of the capsule which is exposed in the pupillary area, the remainder being for a long period preserved from mischief by the protection of the iris. The morbid fluid traversing the exposed portion of the capsule excites a proliferative activity in the epithelium immediately beneath it; a mass of new cells is thus formed, the growth of which is ultimately checked by its own pressure against the capsule. The process is essentially the same, whether on clinical examination the resulting opacity appears punctiform, flake-like, or pyramidal. A perforating ulcer, situated near to the margin of the cornea, may lead to central capsular cataract, its morbid product acting only upon the exposed portion of the capsule. Perforation of the cornea is not necessary to the production of the mischief. During foetal life, in which no anterior chamber exists, any inflammatory affection of the cornea, probably, may suffice to affect the capsular epithelium, and, as a fact, in some cases of congenital anterior polar cataract no trace of a corneal cicatrix is discoverable.

Total Secondary Cataract frequently ensues upon the permanent *contact of the lens with the vascular tissues* of the eye. Such cataracts are met with in connection with the false membranes resulting from severe inflammatory processes in the uveal tract; they are common in presence of retinal detachment, intraocular tumour, cysticercus, absolute glaucoma, cyclitis, irido-cyclitis, and staphylomatous conditions. In all these cases the lens imbibes a morbid nutrient fluid not only in the normal direction (at the periphery), but wherever it is in direct relation with any vascular membrane, a mode of nutrition simulating that which is proper to it in foetal life.

Calcification frequently occurs in cataracts which are in abnormal and close relation with vascular membranes. In

young subjects it may occur even though abnormal adhesions be absent or limited to a few points of synechia, if there be advanced disease of the uveal tract. The chalky deposit is found first in the layer of new tissues formed by the proliferation of the capsular epithelium and in the pseudo-epithelium which forms within the posterior capsule. Later, it invades the entire lens substance, progressing gradually from periphery to centre. Before the nuclear portion of the lens becomes thus transformed a complete calcareous shell is formed around it, and through this a stream of fluid must still pass to carry the calcareous matter to the centre. Calcareous deposits of smaller extent are found in uncomplicated senile cataracts which have become over ripe; they occur as thin films of strongly refracting granules near to the capsule. Total calcification of the lens is a matter of months if not of years, for the intraocular fluid is poor in inorganic constituents, and the interchange of fluids is extremely slow in the degenerating lens.

Ossification of the lens has long been a subject of dispute. Becker admits that a mass of true bone may be formed in the position normally occupied by the lens, and may assume the contour of the lens, the process being an ossification of morbid tissue which has taken the place of the lens and been moulded into its shape by pathological formations surrounding it. He denies that the lens substance itself, while still enclosed in its unbroken capsule, ever ossifies.

Tumours pressing against the lens may excite a proliferative action in the intracapsular epithelium; ultimately the capsule may be eroded and the lens substance invaded and replaced by the cells, stroma, and vessels of the neoplasm.

Secondary cataract does not necessarily depend upon contact of the lens with vascular tissue such as that described above; disease of the uveal tract may induce it, although no adhesion or abnormal contact has occurred between the lens and the surrounding structures.

Constitutional Cataract.—When both lenses become cataractous simultaneously, or one soon after the other, the essential cause is presumably a systemic or diathetic one. The constitutional fault may present itself first in disease of other parts of the eye, and lead through this secondarily to cataract; more commonly it appears to influence the nutrition of the lens

directly—that is, without the intervention of any other ocular disease. Posterior polar cataract arising from retinitis pigmentosa or from other bilateral morbid processes involving the uveal tract, is a well-marked example of the former class, while the latter includes the great majority of the cataracts, other than traumatic, which come under the surgeon's hands for operation.

The nature of the constitutional disturbance which leads to the formation of cataract before birth and in infancy is not known. In the eyes of three children afflicted with congenital cataract who died in infancy, Becker found no trace of any inflammatory process. The only abnormality besides the lental opacity was an excess of proliferating cells throughout the vitreous humour, an indication probably of a disturbed nutrition. Knies has shown that the cell-growth which constitutes capsular cataract may occur some time before any opacity is discoverable; hence it is likely that many cataracts which appear to be acquired in the early months of extrauterine life are in reality congenital in their origin. Instances are on record of a sudden occurrence of opacity in the lens during convulsive attacks. In an infant of eight weeks Just found, two hours after such an attack, cataract in both eyes, mature in the one, incipient in the other; he had previously examined this child's eyes, two elder children of the same parents having congenital cataract, and had found them healthy. The phenomenon may be explained by supposing that some changes in the intracapsular cells were previously present, though invisible, and that under these conditions a slight movement of the lens-substance within the capsule was sufficient to at once induce a visible opacity (*vide* Graefe-Saemisch, vol. v., p. 280).

Diabetic Cataract is the clearest example of constitutional cataract. It occurs at all periods of life, one case having been observed as early as the twelfth year. It occurs simultaneously in the two eyes in even a larger proportion of cases than does ordinary senile cataract. The amount of sugar in the urine is usually large, the general nutrition of the patient greatly impaired; when this is not the case the patient is usually advanced in years. The form in which the cataract appears varies with the age of the patient. In elderly persons it does not differ greatly from the usual types of senile cataract. In

young persons the opacity appears first in the equatorial zone, then a posterior cortical opacity is added, and, lastly, the anterior cortex opacifies also. As in the case of most quickly-forming soft cataracts, the anterior opacity involves first the layers lying immediately beneath the capsule. At this stage there is neither swelling nor shrinking of the lens-substance, but very soon a stellate figure becomes visible, and may be taken in this, as probably in all other forms of soft cataract, as an indication of the imbibition of fluid. Swelling then occurs rapidly through the entrance of fluid into the capsule, and the lens splits up into sectors. The iris still casts a shadow into the lens, on account of the layer of fluid between the capsule and the cortex. A month or two later shrinking begins, the glistening appearance vanishes, the cataract becomes hypermature and of subnormal volume.

The presence of sugar has many times been demonstrated in cataracts extracted from diabetic subjects ; in a few cases no sugar has been found. The negative results bore no relation to the age of the patients, or to the form of the cataracts, but appeared to be directly connected with the amount of sugar present in the urine at the time of operation.

Reviewing the experimental researches of Deutschmann and Heubel as to the occurrence of lental opacity when sugar or salt is introduced into the circulating fluids, Becker concludes that the connecting link between the presence of sugar in the nutrient fluid of the lens and the occurrence of cataract is still undiscovered.

The prognosis of a cataract extraction in a diabetic person is commonly regarded as less favourable than in others ; but from an array of facts gathered from operators of large experience it appears that such cases show an especially good healing tendency ; possibly the abnormal constitution of the aqueous induces an unusually early adhesion of the lips of the wound. Iritis is the complication chiefly to be feared. Also it is noteworthy that there are on record four cases of death by diabetic coma within a few days of the operation.

Premature Senile Cataract.—Becker designates by this name those forms of cataract which are intermediate between the soft cataract of the young and the ordinary senile cataract of the old. They are usually associated with a marked impair-

ment of general nutrition ; but the exact nature of this premature marasmus cannot be defined. A *nuclear* form occurs between forty and fifty years of age ; the nucleus becomes white and strongly light-reflecting, and the opacity spreads very slowly to the cortex. A *punctate* variety occurs at a somewhat earlier age ; points of opacity appear in the anterior, and sometimes in the posterior cortex, and advance with extreme slowness.

Senile Cataract.—After again carefully reviewing the structural changes which occur in the several stages and forms of senile cataract, and the manner in which they are induced (*vide* O. R., vol. ii., p. 269), Becker discusses the *etiology* of the disease. Deutschmann detected albumen in the urine of one-third of his cases, and inferred that renal disease is a frequent cause of cataract. Becker fails to find renal disorder in nearly so large a proportion, and in view of the frequency of chronic nephritis among elderly people in general, declines to admit the connection as proved. Michel has asserted that senile cataract is a result of atheroma of the carotid artery and consequent interference with the blood stream to the eye and the supply of nutrient fluid to the lens. Adolph Weil, at Becker's request, tested this assertion by the clinical examination of the condition of the heart, the brachial and radial arteries, and, as far as was possible, of the carotid arteries, in fifty-three persons of various ages affected with cataract. In sixteen of these disease of the carotids was discoverable, in thirty-seven there appeared to be none ; in six only of the sixteen did the most pronounced arterial disease and the most advanced cataract occur on the same side ; in four cases the cataract was unilateral, and in not one of these was there any arterial degeneration. Hence Michel has clearly gone too far in assuming an intimate connection between cataract, both bilateral and unilateral, and atheroma of the carotid artery. Becker admits nevertheless that some truth may underlie the ideas of Deutschmann and Michel. Chronic nephritis is usually associated with changes in the walls of the small arteries and capillaries ; again, when the carotid is the seat of considerable atheroma, it is likely that the vessels of the uveal tract, although the ophthalmoscope may not reveal it, are similarly affected ; hence it may be that degeneration of the intraocular blood-vessels is the hitherto

missing link between nephritis and disease of the carotid on the one hand, and cataract on the other.

3. *Pathological Changes in the Lens caused by Injury*.—This, the third group in Becker's systematic classification, is not included otherwise than by a brief reference in the work before us.

The volume closes with a list of the authors and works quoted, an alphabetical index of subjects, and an explanatory description of the plates.

The abstracts which we have given are little more than a skimming of the surface, but even from them our readers will perceive that the book represents a very extensive research on the part of Professor Becker and his assistants, Dr. Da Gamô Pinto and Dr. H. Schäfer, and that it is a most important addition to the literature of scientific ophthalmology.

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